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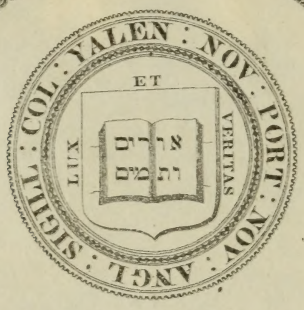

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DISEASES OF THE OVARIES

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DISEASES OF THE OVARIES:

THEIR DIAGNOSIS AND TREATMENT.

BY

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PREFACE.

In 1865 I published the volume containing reports of 114 cases of ovariotomy which is alluded to with quotations from the introduction at pages 304-5 of this work. That volume was little more than a simple record of actual facts. I intended to follow it up by a second volume containing a summary of the lessons to be learned from a study of the facts related in the first volume. But the number of cases increased so rapidly that my whole time was taken up by bedside work. The book was soon out of print, and though repeatedly asked for a new edition, or a reprint with additions, I was unable to do more than prepare papers for the Royal Medical and Chirurgical Society as series after series of a hundred cases accumulated. On the completion of 500 cases I felt that this experience ought to be made use of, and I have endeavoured in the present volume to arrange the results in a convenient form for the Student and Practitioner. It would have been impossible in any reasonable space to relate 500 cases in such detail as the 114 cases of the former volume, and such a record would have been very wearisome to the reader. I thought it better, therefore, to be content with giving the chief particulars of all these cases in the tables which may be found at pages 402-429 in this work; and only to relate a few of the cases

which had some special interest. This plan has led to the publication, not of a new edition of the first volume, nor of a second volume following the first, but of an entirely new work, which I hope may prove acceptable to my professional brethren and useful to suffering women.

In introducing the volume written in 1864 I performed a very pleasant duty in thanking many friends who had assisted me in the labours recorded in those pages. Of those friends, Dr. Ritchie and Dr. Wright have gone before and rest from their labours, leaving sad but kindly thoughts of them to us who remain for a time to work. Dr. Aitken, Dr. Wilson Fox, and Dr. Frank, have all continued the aid they have always been ready from the first to give me. Dr. Day, Dr. Bantock, Dr. Wiltshire, and other of my colleagues at the Samaritan Hospital have most zealously assisted me in the wards, while Dr. Junker and Mr. W. Thomson have helped me in private practice. Dr. Junker has also made many of the drawings engraved in this volume, and has supplied descriptions of many of the tumours removed, and a valuable series of preparations of bony matter and teeth from dermoid cysts. Mr. Thomson has given me great assistance in preparing the tables, calculating the results, and generally in the labour of preparing this book for the press. To each and all I offer heartfelt thanks; but more especially to those professional brethren who have assisted me by entrusting their patients to my care. What I wrote in 1864 I repeat now, 'Every patient whose case is recorded in the following pages has been confided to me by some member of the noble profession to which we all belong. Many are old friends; some were strangers, until a common interest in a patient led to an acquaintance which has since ripened into

intimacy or friendship; others, either settled abroad or in some distant part of this country, I regret to feel are still personally unknown to me. But to all alike—at home or abroad, strangers or friends—I now offer this volume, with heartfelt thanks for the confidence which they have reposed in me, and with the hope they will believe that I have not been unmindful of the honour which they have done me, but have endeavoured from the knowledge which they have enabled me to acquire to make useful additions to the science and practice of our profession.'

Arrangements have been made for the publication of this volume in New York on the day of its publication in London, and I hope the friends who so cordially welcomed me in the United States and Canada in 1867, will accept the work with as much indulgence as they received the Author.

A French translation by Dr. Boddaert, of Ghent, and one in German by Dr. Grenger, of Dresden, are already in the press.

Upper Grosvenor Street, London:
September 2, 1872.

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DISEASES OF THE OVARIES:

THEIR DIAGNOSIS AND TREATMENT.

CHAPTER I.

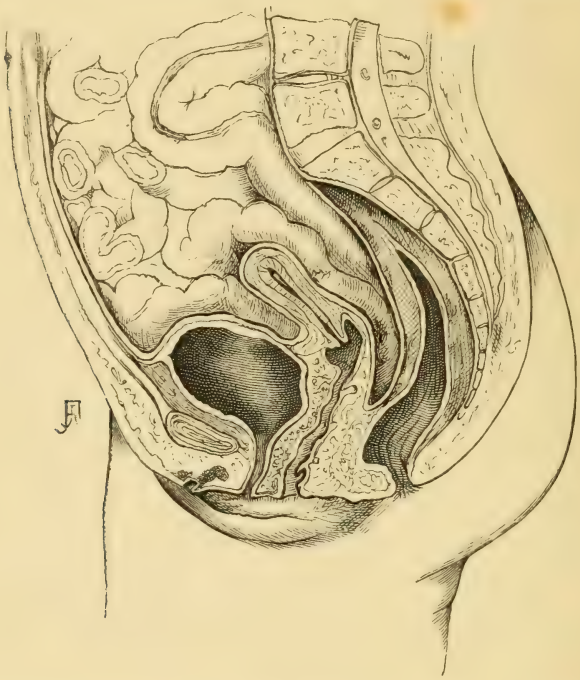
ANATOMICAL AND PHYSIOLOGICAL NOTES ON THE OVARIES AND THEIR APPENDAGES.

The first condition of living organisation is that of the reproductive cell. For its one end of multiplication it is alone and self-sufficient, or at most has only certain relations with other cells equally isolated and independent. Throughout the whole ascending scale of beings it still maintains its predominance. In some, death follows the reproductive effort. The ovum is perfected, the parent dies. In others, the creature has not only to produce the ovum, but is instinctively compelled, in a temporary sacrifice of every vital power, to assist its full development by incubation. Even in the human species these cells appropriate the most important portion of life, and monopolise for their origin, evolution, and perfection, the complex series of generative organs; while those by which we maintain external relations have more or less reference to parental duties.

The mass of ovisacs, with their contained nuclei, are the essential part of the human ovary, and it is the centrepiece of the group of sexual organs. Vagina, uterus, Fallopian tubes, nerves, arteries and veins, even man himself with his spermatic apparatus, are only accessories and contributory means to the vivification, growth, and maturation of successive generations of these ovarian cells.

Some account of the anatomy and physiology of the female organs being necessary for the elucidation of their pathology,

the accompanying diagrams of a section of the pelvis of a woman, first in the erect position, and afterwards in the recumbent position as she is placed for the operation of ovariotomy, have been designed to assist in the attempt to describe what may be termed the surgical anatomy of the pelvis, so far as the operation is concerned, and any surgical treatment which may be necessary during the progress of the patient after operation.

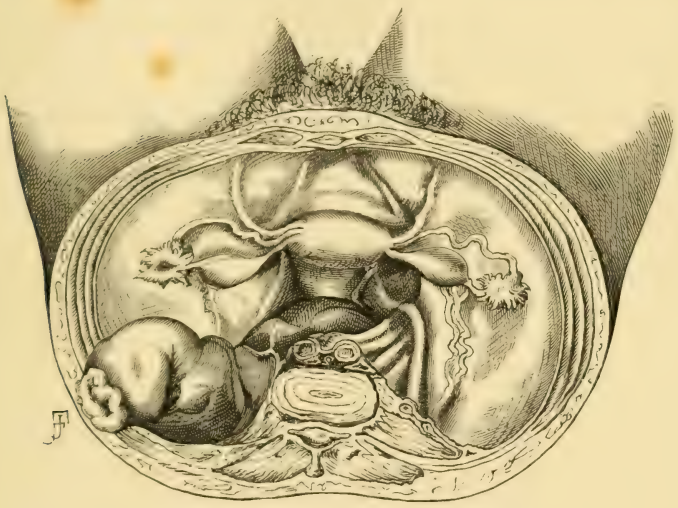


The first diagram represents the relations between the rectum, bladder, and uterus, with the pouches formed behind and in front of the uterus by the folds of peritoneum passing from the rectum and bladder to the uterus.

Portions of small intestine are seen between the uterus and bladder and uterus and rectum, as they are often found in nature. In most books these spaces are described or represented as empty, the opposite peritoneal surfaces being in contact; but making allowance for varying states of fulness of rectum and bladder, I feel sure this diagram represents a very usual condition. The relations with the sacrum and pubes are

also shown. It is not easy in such a sketch to show accurately the relations of the ovaries to the surrounding parts, but in the second diagram this is attempted.

The outline of the pelvis, the sacrum, and vertebral column, are the foundations of this sketch, which is reduced from one



of Dr. Savage's beautiful plates. Then the ureters and the iliac vessels are shown in their normal relation with the psoas muscles, passing downwards in front and to either side of the vertebral column. The sigmoid flexure of the colon is also shown curving downwards from the left towards the right to where it becomes the rectum in the hollow of the sacrum. Each ureter as it descends into the true pelvis curves inwards to reach the base of the bladder. It lies close behind the peritoneum, and is connected loosely by cellular tissue to the parts immediately around it. It rests upon the psoas muscle, and is crossed obliquely by the spermatic vessels which lie in front of it. The right ureter is a little external to the inferior vena cava. It passes over the iliac vessels behind the junction of the ileum with the cæcum. The left ureter lies behind the sigmoid flexure of the colon. Both ureters pass along the sides of the cervix uteri and upper part of the anterior wall of the vagina before they run obliquely through the coats of

the bladder. On either side are the ovaries in their normal relation with the uterus, the Fallopian tubes curving over them and expanding at their open fimbriated ends. The utero-ovarian ligament is also clearly seen on each side behind the Fallopian tube, the round ligament curving outwards and forwards in front of it, away from the utero-vesical folds of peritoneum which form the so-called ligaments of the bladder. And it is easily understood how the pedicle of an ovarian tumour on the left side is connected with the sigmoid meso-colon, and on the right side with the meso-cæcum ; while on either side the corresponding ureter must necessarily be very near a pedicle which is short. It is also seen that a cyst adherent low down might require separation from the bladder in front, from the brim of the pelvis on either side, from the rectum, sigmoid flexure, or cæcum, and that if the peritoneum in front of the vertebræ and psoas muscles were much disturbed, the iliac vessels and ureters might be in great danger.

The whole of the female organs of generation, in the natural and unimpregnated state, either lie within the basin of the pelvis or are attached to some part of it. They consist primarily of the two ovaries and parovaria. Leading from them are the two oviducts, which at their distal ends unite, enlarge, and thicken into the organ of incubation, the uterus, and are continued in a more expanded form, as the vagina, to the aperture of the vulva, thus completing the communication with the outer world.

The *vagina* is a membranous canal extending from the vulva to the uterus. In its general direction the vagina corresponds with the axis of the lower part of the pelvic cavity and of the outlet of the pelvis; but, as its inferior orifice is somewhat in front of the centre of the antero-posterior diameter of the outlet, it is even more curved than these axes. In consequence of this curve, that which is the superior wall of the vagina, near the vulva, becomes its anterior wall higher up in connection with the bladder, while there is a corresponding change behind ; so that the terms superior and anterior are used indifferently to denote the wall next to the bladder, and inferior and posterior in speaking of that curving up in front of the rectum. Anteriorly the vagina is in relation with the fundus of the bladder, to which it is attached by dense fibrous tissue, and with

the urethra, which has almost the appearance of a canal channelled in its anterior wall. Posteriorly it passes up in front of the rectum, from which its upper third is separated by a double layer of peritoneum, and to which its two inferior thirds have attachments less firm than those found between the anterior wall and the bladder. The sides of the vagina are imbedded in the areolar tissue of the pelvis and various venous plexuses, while above they receive the expansions of the broad ligament of the uterus. On making a transverse section of a young and untouched vagina, it is seen not to be a cylindrical tube, but that, from the actual contact of the walls, there is a total disappearance of anything like a cavity. The folding together of the vaginal walls is at the upper end in a transverse direction, while below it follows the median line of the labial opening. Later on in life the canal readily dilates into a pouch the moment the labia are separated and air finds admission. The length of the vaginal passage is about four inches, and its average breadth one inch. It is broadest at its uterine extremity, and narrows progressively as it approaches the vulva. The extensibility of the vagina is so great, that it is a difficult matter to determine its normal dimensions. If from any cause the uterus becomes a little heavier than usual, it sinks into the pelvis and the vagina is shortened. On the contrary, when there is such an enlargement of that organ that it rises above the brim, or it is so dragged up by an increasing ovarian tumour, a lengthening of the canal naturally takes place. In some women there is congenital shortness. Dewes gives a case in which it was only an inch and a half in length, and Dr. Churchill says that he has met with similar instances. Variations according to race and nationality are also observed. The vagina varies in breadth as much as it does in length, and the passage of the fœtal head is sufficient proof of its power of lateral distension. As a general rule, child-bearing women have the vagina left more capacious than it is in the virgin, though much depends on the peculiar habit of body. Occasionally the congenital constriction is extreme, and in some rare cases the canal has only been represented by a line of fibrous induration.

The vagina is covered with a mucous membrane, continuous with the investment of other parts. It has a large tesselated

epithelium, which, however, is not continued into the uterus, but ends abruptly at its orifice. The vaginal mucous membrane, especially in the superior half of the canal, is thrown into numerous transverse folds which start from a raphe in the mesian line. There is such a raphe both in the anterior and posterior wall of the vagina; they are called the anterior and posterior vaginal columns, and the former is much the more distinct of the two. No glands are found over the greater part of this membrane, though many writers include them in description. They, however, abound near the orifice, and there are some at the upper end of the passage.

External to the mucous membrane is the proper coat of the vagina, which, according to Cazeaux, is composed of layers of fibrous tissue, enclosing one layer of erectile tissue. This erectile tissue is entirely wanting at the uterine end of the vagina, but becomes more and more developed towards the opposite extremity. Near the vulva it consists of a plexus of veins arranged in several layers one over the other. Just around the mouth of the vagina this plexus is felt more prominently, and forms what has been termed the bulb of the vagina. The bulb of the vagina is the analogue of the bulb of the urethra in the male. It is somewhat of a horseshoe form, and embraces three-fourths of the circumference of the vaginal orifice. In the middle space, where it is placed between the roots of the clitoris and the opening of the urethra, it is thin, but gradually increases in thickness as it descends on each side of the aperture, and terminates in a club shape. The injected bulb is about an inch and a half long, and nearly half an inch thick at its broader and lower end. It has a cavernous structure, and communicates freely with the corresponding tissue of the clitoris, and, like the rest of the erectile parts of the vagina, with the deep pelvic veins. It is enclosed in a fine membranous covering, and overlaid, for the most part, by the bulbo-cavernous muscle.

Near the womb the vagina consists only of two layers; the outer fibrous or contractile coat, and the mucous membrane. The contractile fibres are continued outside the neck without being in any way connected with it, and go to be inserted into the body of the uterus, in the proper substance of which they are imperceptibly lost. The mucous membrane extends above the

level of the os uteri, and then, leaving the fibrous tunic which it had previously lined, is reflected on to the outside of the cervix, and, proceeding downwards to the orifice, enters the cavity. In being thus reflected the mucous membrane of course forms two culs-de-sac; one in front of the cervix, the other behind it; and as posteriorly it accompanies the fibrous tunic somewhat further than it does in front, it follows that the posterior cul-de-sac is the deeper of the two, and the posterior lip of the uterus is the one most clearly defined. The union which exists between the mucous membrane and the upper part of the cervix uteri is slight and loose, but is very dense round the margin of the os. So much so is this the case, that if in the dead subject the womb be pulled up out of the pelvis from above, the vaginal portion of the cervix uteri will disappear entirely; and the same result follows when, from disease or other cause, the living uterus is drawn upward into the abdominal cavity.

The vaginal arteries rarely arise as separate branches from the internal iliacs. Usually they are offshoots from the uterine, vesical, or the middle hæmorrhoidal, and the vagina receives branches from all of these. The veins of the vagina form a most elaborate plexus outside its walls. They have no common relation whatever with the erectile tissues of the canal, and they are most numerous where this tissue is deficient, namely, near the uterus. They may terminate in the uterine veins, and have free communication with the pudendal and pelvic veins. None of them are provided with valves; a fact which at once explains the ready occurrence of extravasation and hæmatocele of this part. The lymphatics fall into the plexus iliaci, and the nerves are branches of the hypogastric plexus.

The *uterus*, or womb, is a hollow muscular organ shaped very much like a pear, and partially flattened in its antero-posterior diameter. At puberty its greatest length from the fundus to the lower end is about three inches; its greatest transverse diameter, between the two Fallopian tubes, nearly two inches; and its average thickness an inch. It ordinarily weighs from an ounce to an ounce and a half.

A merely superficial glance at the uterus is sufficient to show that the organ is divided naturally into two parts; the upper two-thirds of the flattened pear being separated by a slight

constriction from the lower third. The upper division is the body of the uterus, and the seat of gestation, while the lower portion, or cervix, may be subordinately useful during parturition, but is destitute of distinct function, and must be regarded as the remains of a fœtal condition.

The uterus is suspended in the upper and central part of the cavity of the pelvis, and its long diameter corresponds in direction with the axis of the inlet; but the position is liable to considerable variation. It may be low in the basin, and then, as a general rule, the axis is the same as that of the lower part of the pelvis; or it may be directed backwards, forwards, or to one or other side, without the deviation being abnormal, in the strict sense of the word.

Occasionally the axes of the cervix and the body cross each other and meet at an angle, producing what is called anteflexion or retroflexion, according to the direction of the flexure of the body. Although no morbid symptoms may be present so as to justify this being considered always as a pathological condition, and although M. Follin has shown it to be rather a persistence of the fœtal state than an aberration from nature, yet, in most cases of considerable flexion, well-marked symptoms are recognised.

For the purposes of description, we may take separately the back and front surfaces of the uterus, its two borders, the fundus, and its apex at the lower end. The anterior surface is only slightly convex, with its upper two-thirds covered with peritoneum reflected from the bladder. It forms part of the floor of the abdominal cavity, and has in contact with it some coils of small intestine. Areolar tissue unites the lower third to the bladder. The posterior surface is much more bulging than the other, and is entirely overlaid by peritoneum, which is continued some distance down on the posterior wall of the vagina, and thence, turning upwards over the front face of the rectum, forms the pocket or bag called Douglas's space. Immediately behind it is the rectum, with portions of small intestine sometimes intervening. Some, however, say that in healthy women, with no displacement of parts, the uterus and rectum are always in close apposition.

The borders of the uterus have a doubly curved outline—convex above, concave below. They give attachment to the

broad ligaments, round ligaments, Fallopian tubes, and ligaments of the ovaries. The broad ligaments pass from the lateral walls of the pelvis to the borders of the uterus, and are inserted on such a plane that the whole bulk of the uterus appears to project behind them.

The fundus uteri, rounded, with peritoneal investment, is directed upwards and forwards, and rises to a point a little below the level of the brim of the pelvis. It can seldom be detected by the hand above the pubes, unless much enlarged, or the abdominal walls be very thin and lax.

The general form of the body of the uterus is triangular, the inferior angle being the point of junction with the cervix, and the two upper angles having in them the orifices of the Fallopian tubes. A line drawn between these two points gives the greatest transverse diameter of the uterus. The arc above this diameter is known to anatomists as the fundus uteri, while the rest is simply the body of the womb.

The neck of the uterus is fusiform, one inch long, ten lines broad, and five or six lines thick. On its conical end, which projects into the passage of the vagina, is the os externum, a transverse opening with two lips in women who have borne children, but round in virgins or sterile women. Of these, the front lip is thicker, that behind longer and thinner. The axis of the neck and body of the womb, when there is no flexion, is on a line running from the navel to the junction of the first and second bones of the coccyx.

The cavity of the uterus has a form very nearly identical with that of the organ, but is comparatively small. The upper part retains traces of the transitional bifurcation, and in the two funnel-shaped angles are the minute orifices of the Fallopian tubes. At the lower angle, a constricted opening, the os internum, leads to the canal of the cervix. This canal, about an inch long, widest in the middle part and flattened from before backwards, opens by the os externum into the vagina. The whole interior of the uterus is lined with mucous membrane, smooth, glandular, and bearing ciliated epithelium in the body; numerous papillæ, follicular glands, and closed glands, the so-called Ovula of Naboth, exist in the neck; and corrugations of the membrane thrown up by muscular bands on the two opposed surfaces, in a trunk and branch-like form, are called the arbor

vitæ. The great bulk of the uterus is made up of non-striated muscular fibre, with the usual admixture of nerve, blood-vessel, and areolar tissue. No particular distribution of these fibres can be made out till they are largely developed during pregnancy, when three separate layers are easily distinguishable. The fibres of the inner layer have mostly a circular arrangement round the several openings, and serve as constrictors or dilators; the middle layer is confusedly dispersed over the whole organ in a thick network, while the fibres of the thin outer layer mostly converge towards the oviducts, the neck and ligaments, as points of insertion.

The uterus receives its blood from two large arteries on each side—the spermatic, which are branches of the renal, or are sent off from the aorta itself; and the uterine, derived from the internal iliac. These anastomose very freely, and are very tortuous in the substance of the uterus. A small branch occasionally runs off from the epigastric along the round ligament. The veins are of a large size, correspond with the arteries, have no valves, form on the outside the uterine plexus, and in the substance of the womb expand into large sinuses.

The nerves of the uterus come from the sympathetic, renal and hypogastric plexuses, with some twigs from the sacral plexus. The lymphatics are abundant, and terminate in the pelvic and lumbar glands.

Gestation of course much modifies the condition of the uterus. It remains more bulky, heavier, with its cavity more expanded, the cervix shortened, and the vaginal orifice looser, more transverse in direction, and often fissured and congested.

The uterus retains its central position in the pelvis chiefly owing to the peculiar manner in which the peritoneum invests it, and diverges to the pelvic walls and other parts. That membrane, after having lined the anterior part of the abdomen, doubles backwards over the top of the bladder, dips down a little way between it and the womb, to form the vesico-uterine pouch, ascends over the front and fundus of the womb, sinks down deeply behind, not only over the posterior surface of the uterus, but on to the upper half of the vagina, and then, with a sharp fold turning upwards over the back part of the pelvis, includes the rectum, and forms the deep recto-uterine pouch or space of Douglas. Such is the antero-posterior distribution

of the peritoneum. Quitting the border of the uterus, the two layers of peritoneum approach each other to form the broad ligament, and enclose a quantity of loose areolar tissue prolonged from the general mass lining the pelvic basin. Besides this tissue, the broad ligaments enfold a number of structures of especial interest—the Fallopian tubes and ovaries, with the ovarian and round ligaments, the parovaria, and the spermatic vessels and nerves. Spreading out towards the pelvic walls, the peritoneum is gathered, both to right and left, into three separate folds; the posterior one passing by the side of the rectum, that in front from the neck of the uterus over the side of the bladder towards the inguinal canal, and the large central portion making a septum across the pelvis from its side to the border of the uterus.

That part of the oviduct proceeding from the upper angle of the uterus towards the ovary is called the *Fallopian tube.* Very small at its uterine end, it expands at the other into a trumpet form, its internal surface thrown into many long folds, with the edges finely fimbriated, and on one side prolonged in the direction of the ovary, with which it is connected. The length is from three to four inches. The mucous membrane, supplied with ciliated epithelium, is surrounded by circular contractile tissue, with a superficial layer of longitudinal fibres. The fimbriæ, though so delicate and transparent, have a marvellous network of capillaries, and are in fact folds of peritoneum, enclosing elastic fibres and covered with ciliated epithelium, in the transitional state between what is ordinarily spoken of as serous surface and mucous membrane. They are erectile, and are known under special stimulation to embrace the ovary. A fanlike layer of muscular fibres sometimes radiates towards them, between the two layers of the broad ligament.

The *ovaries* are usually two in number; not necessarily so, for their essential elements may be dispersed between layers of the peritoneum, as in the lower animals. Ovisacs or Graafian vesicles have been seen developing in some of the mammalia at a distance from the entire ovary. Cases exceptional to the ordinary almond-shaped aggregation of the ovaries have been mentioned as occurring in the human subject. Grohe found a uterus accompanied by three ovaries, one on the right side,

normal; two on the left, together equalling it in bulk. The woman was excitable and had borne children. It has happened also that the ovaries are wanting, with concurrent absence of the uterus, or arrested development of that organ at the fœtal stage. Growth of one horn of the uterus with one ovary has also been noticed by Klob, the other half and ovary being absolutely deficient. The lateral deficiency of the ovary and duct prevails naturally in the class of birds. As a rule, however, from the mechanism of the sexual organs, the common form of ovary is necessary for the process of procreation. It is said to be the analogue of the male testis. But the difference consists in this fact—that in the ovary the developing cells are plastic or endermic, while the spermatic cells of the testis are epidermic. In all cases the coalescence of these two forms of cell seems to be necessary for the reproduction of the perfect creature.

The shape of the ovary is frequently fusiform, with unequal sides. More commonly, however, it represents a flattened ovoid, of which one third of one lateral segment is substituted by a straight side. The ovary, therefore, has two borders, the upper one free, convex, and thickened; and the lower straight border, where the vessels enter the hilus ovarii, and by which the organ is attached to the posterior duplicature of the broad ligament. Of the two ends of the ovary, one, directed outwards, is broad, thick, and rounded; the other end, approaching the uterus, is tapering, and by degrees sinks into the ovarian ligament. Both sides of the ovary are convex, but the anterior is shorter and less vaulted than the posterior. Before the age of puberty the entire surface is smooth; but after repeated menstruation and conception it becomes, especially on the hinder side, and in proportion with the occurrence of those physiological processes, more and more uneven and nodular, in consequence of the cicatrisation of burst Graafian follicles and the shrinking of the yellow spots.

The size of the ovary varies according to the age of the individual and the state of sexual activity. Normally the ovary of a young woman averages one inch ten lines in length, ten lines in width, and one inch in thickness. Dr. Farre gives the following table of the dimensions of twelve healthy ovaries, taken indiscriminately from women during the period of fertility:—

	Longitudinal	Perpendicular	Transverse
Highest	2″	1″ 1‴	6‴
Lowest	1″	6‴	3‴
Mean	1″ 4‴	9‴	4½‴

After the cessation of sexual life the ovaries appear longer, shrivelled, of almost cartilaginous consistence, and only one-half, or even only one-third, their former size. During pregnancy, however, the volume is often doubled. The weight is also equally variable ; that of the ovary of a robust non-pregnant woman being about one and a half drachms. According to Dr. Farre, the following are the extreme and mean weights of five ovaries taken from healthy adults : viz.

	grains
Greatest weight	135
Least „	60
Mean „	87

The ovaries lie on a line level with the inlet of the true pelvis, in pouches formed by the posterior layers of the broad ligament ; one on either side of the uterus ; behind the Fallopian tubes and round ligaments, by which they are separated from the bladder ; on the left side in front of the rectum ; on the right in front of coils of small intestine which descend into the pouch of Douglas.

In order to obtain a clear view of the position of the ovaries and their relation to the peritoneum, one may imagine the space in the pelvic basin between the bladder and rectum, or the recto-vesical hollow, divided into two by a peritoneal reflection, with the free border directed upwards in the transverse diameter of the pelvis. If the uterus with the Fallopian tubes be inserted from below in the median line of this fold, without filling up its whole width, the two empty portions of it between the borders of the uterus and the walls of the pelvis will represent the broad ligaments. Now, placing the two ovaries one at each side of the uterus, between the two layers of the broad ligament, and causing them to lodge in a pouch-like expansion of the posterior layer behind the Fallopian tubes, their position as found in nature may be realised. The peritoneal coat of the ovary is therefore incomplete. It is deficient at the border which is directed towards the anterior

layer of the broad ligament, where the blood-vessels pass into and out of the hilus. The ovaries are connected with the uterus by means of the ovarian ligament, which, a prolongation of the contractile tissues of the uterus itself, is inserted at the conjunction of the upper and middle third of its lateral border. This ligament has an average length of rather more than an inch, and is at its ovarian end about two lines thick. It is enveloped in peritoneum, consists of organic muscle, and is continuous with the convergent fibres of the superficial muscular layer on the posterior wall of the uterus.

In 1843, Dr. Pank, of Dorpat, endeavoured to demonstrate the existence, after impregnation, of a new-formed connecting membrane between the ovaries and the Fallopian tubes. In many animals, as the dog, the marten, the polecat, the otter, the seal, &c., a complete capsule of reflected peritoneum establishes a perfect coaptation of the tubes to the ovary. In other animals and man, this connection is effected only for a time by a special formation of membrane, which shortly disappears by absorption. In a young woman who had committed suicide immediately after conception, Dr. Pank saw the fringes completely incapsulating the ovary, and fixed to it by extremely fine, recently-formed membranous tissues. During his further investigations among women of every age, he observed this connection thirty-four times in fifty-eight cases, but only in such as had borne children. These membranes were very delicate and hyaline, spread over part of the broad ligament and posterior surface of the uterus, and when much developed reaching up to its upper border. They never extended so far as the anterior surface of the uterus, nor to the neighbouring organs, as the bladder and intestines. The fimbriæ thus came to be more or less closely adherent to the ovary for a time, and the intermediate membrane had always the same appearance and structure, and consisted of new connective tissue rich in nuclei, with fine oil granules, numerous in proportion to the advance of fatty degeneration. This formation originating in the act of conception, and not the product of inflammation, can hardly be so common as Dr. Pank asserts.

The structure of the ovary is very complex. It is not uniform throughout life. The functional activity is intermittent and limited, and determines the changes of its internal

anatomy. In all true glands the seat of secretion is the epithelial bed, but the reproductive process of the ovary is endermic. The mature ovary consists of a mass of reproductive germs and cells, with nerves and vessels for their growth and nutrition, enclosed in coverings or tunics which regulate their form and position. These tunics are two in number, the outer one serous or peritoneal; that which lies immediately beneath it, and is the real capsule, has a fibrous structure, and is called the tunica propria, or albuginea.

The serous coat is a fine expansion of peritoneum, forming part of the posterior lamina of the broad ligament. Its deeper fibrillated stratum is intimately connected with the sub-lying fibrous tunic, and can scarcely be separated from it. But near the hilus this serous tunic is more loosely adherent, and forms a sort of mesenteric fold. The epithelium is uniform with that on other parts of the peritoneum. But recently Waldeyer of Breslau, supported by Leopold of Leipzig, has disputed these statements. He maintains that the true peritoneal membrane stops abruptly near the hilus, that the ovary projects into the abdominal cavity as a free structure, and that it has a special epithelial layer of its own, lying on the fibrous coat. He describes this as germinal epithelium, and says that flask-shaped prolongations of it dip into the substance of the gland, enclosing mother-cells, and that in this way the ovisacs and ova originate. But all this is only to be seen in the ovaries of young people. After the age of thirty it is difficult to show any interruption to the continuity of the peritoneum, or any difference between the epithelium of the ovary and that of the adjacent portions of the serous membrane. Leopold also adds that his confirmatory investigations on the perfectly fresh ovary gave him very unsatisfactory results, and that he was obliged to use reagents to produce the appearances described by Waldeyer. It is therefore well to wait before accepting these views, which would materially affect some physiological doctrines.

The tunica propria under the peritoneum is a whitish layer, about one-third of a line in thickness, of a peculiar form of connective tissue, having fibres irregularly disposed in a dense matrix, and blended with it prolongations from the fibrous structures of the interior of the organ. It is but slightly

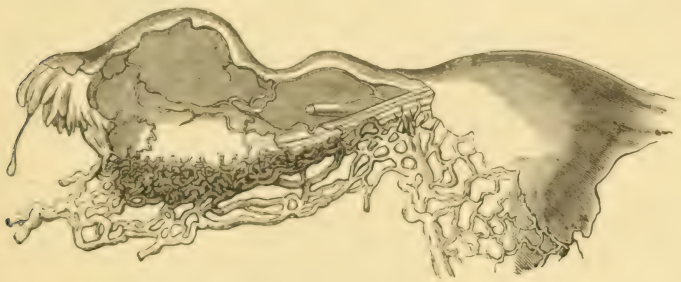
vascular, and uniformly spread over the ovary, except near the base, where an irregular band of fibres, raised above the general level, is found on either side of the hilus, with only scattered portions of tissue interlacing among the vessels. At the inner extremity of the ovary this structure assumes the form of a cord, and passes to the side of the uterus, increased in bulk by the addition of muscular fibres from the uterine walls.

Next to, and being the under surface of, this tunica propria, is found a stratum of minute embryonic cells, called by M. Sappey the *couche ovigène*, supported by and intermingling with the areolar tissue and vessels, which all have a distribution converging towards the hilus. These germs and cells are most numerous at the early stages of life. The measurements and calculations of Sappey put their numbers after puberty at about seven hundred thousand for the two ovaries, and there is every reason to believe that this is not far from the truth. In a child four years old the estimate of these rudimentary ovarian vesicles rose to more than one million. They may be seen with great ease by a power of 300 in fine vertical sections made from the fresh ovary. All stages of development seem to exist at the same time. Those which, as they become more mature, grow larger, and cease to be microscopic, are vascular, and form connections with the surrounding areolar tissue or stroma of the ovary. They are then called Graafian vesicles, or the ovisacs of Dr. Martin Barry. They are diversely disposed in the organ; some develop in the stroma, others nearer the periphery of the ovary, but all, as they ripen, if perfect and uninjured, find their way at last to the surface, through which, by atrophic thinning and bursting of the cell or sac wall, the ovum is launched into external life.

As may be imagined, the size of these ovisacs is progressive. In some parts of a section of the *couche ovigène*, nebular masses of germs can be seen; mixed with these are groups as large as blood corpuscles; close by, other ranges or aggregations of larger cells, distinctly nucleated, disclose themselves as the focus of the lens is altered, and interspersed are many more in further stages of development, with some few showing the capillary investment, and advancing as they grow bigger towards the surface. If uncompressed, they all maintain a

globular or ovoid form, but, laid under the thin glass for examination, this slight weight makes them look polygonal and irregular. By far the greater proportion of the germinal ovisacs have only a transient and intra-ovarian existence, and ultimately, by some retrograde morphological changes, disappear. A beaded arrangement of the vesicles in some animals, and it is said even in the early human fœtus, has led to the suggestion of a tubular structure of the ovary by Pflüger and Valentin, but the fact requires confirmation, and is not generally admitted.

As the more mature Graafian follicles enlarge, they detach themselves from the layer of ovisacs, acquire delicate connections with the loose areolar tissue of the parenchyma of the ovary, become distinctly fibrous, and are surrounded by loops of capillary blood-vessels, very similar in their distribution to those found on the solitary glands of the intestines. This arrangement leaves them a certain freedom of motion, correlative with the coiled spring-like form of the spiral arterial ramifications by which they are supplied with blood. These little arteries are derived from the tortuous ovarian arteries which spring from the convex bend made by the spermatic in joining the uterine artery. They pass through the hilus of the ovary, separate into numerous branches, which radiate through the ovary, each turning in the form of a cork-screw till it reaches as its point of distribution, the base of an ovarian follicle. The blood returns by large tortuous veins which anastomose, dilate, form large sinuses, and pass out through



the contractile hilus. On the back and under surface of the ovary they are brought together as a dense plexus, the bulb of the ovary. Free communication takes place between this

plexus and that of the uterus, and so the chain of connection is kept up with all the other erectile and turgescent structures of the pelvic and external organs.

These elements, then, the arteries, veins, and elastic areolar tissue, constitute the darker-coloured stroma of the ovary, occupying that part of the interior from the base to the inner surface of the layer of germ sacs. Nerves and lymphatics also make up a part of this network of tissue. Dr. Farre adds that the intermediate spaces are 'filled up by a fibrous structure, not separable into bundles, like ordinary connective tissue, and having no distinct fibrillar arrangement, its chief elements being single white fibres of ordinary connective tissue, numerous fusiform embryonic fibres, and elliptical and round cells or granules, the whole being coherent and strongly united together.'

The ovary is an organ which undergoes a series of changes throughout the greater part of life. Childhood and youth are taken up with its development, and it is then small, elongated, with a smooth, unbroken surface, and free supply of blood. After puberty functional activity takes the place of growth, and there is greater turgescence, more rotundity of form, an often repeated laceration and scarring of the surface, replacement of the natural contents by the vestiges of the evolution, accompanied by a constant tendency to arrest of function and disease. After the period of active ovulation has passed, old age brings with it the usual retrograde action and marks of atrophic decay. The gland is found small, shrivelled, nodular, seamed with scars, and pale. With this collapse of the organ, and decline of its pre-eminent function, the distinguishing characteristics of feminine character and configuration gradually disappear.

The ripe, true ovisac may easily be enucleated from the fibrous capsule with which it is invested in the ovary. As it lies upon the glass for microscopical examination, it is a whitish looking, translucent, round or ovoid body, which, if taken from the living or recently dead animal, is found to be vascular by the movement of blood corpuscles, seen under a high power, in minute capillaries anastomosing at wide intervals in and on the substance of the membranous coat. The external fibrous 'vascular tunic of the ovisac' of Barry has been left behind, and is

the part in which the embracing terminal branches of the coiled arteries may be observed in injected sections of the ovary. This tunic, coat the first of the Graafian follicle, is no part of the original ovisac, but is gradually thickened and vascularised about it, as development advances; and it is on all sides continuous with the ovarian stroma. Its attachments to the real ovisac are very slight, and would seem to be chiefly vascular. It is a highly organised membrane with clear expansions, fibres and nuclei intermixed, and numerous blood-vessels, but it cannot easily be dissected out clean as a whole from the ovarian stroma. Its inner surface, when the true ovisac has been expelled artificially, is smooth, though vascular. As the ovum ripens, the most prominent part on the ovarian surface undergoes atrophic thinning. A very slight force is now sufficient to produce the rupture of the follicle at this precise spot, and such a force is supplied, according to most physiologists, by the gradual accumulation of fluid within the capsule, whether albuminous or sanguineous.

There are, however, other agencies in operation which have, perhaps, more influence in causing the escape of the ovum from the ovisac at the proper moment. The fimbriæ, when applied closely to the substance of the ovary, have no doubt a suction power adequate to the purpose, by producing some approach to a vacuum. The spiral arteries also are so firm and elastic that they too under due excitement, by uncoiling, can exert a certain amount of projectile impulse. But there is still another co-operative, if not independent, source of pressure, enough by itself to account for the phenomenon, arising from the closure of the venous sinuses by the compressing band of contractile tissue round the hilus. The free egress of the blood being prevented, and the incompressible arteries continuing to inject, the amount of pressure brought to bear upon the contents of the organ may be so increased as to burst any vesicle near maturity. In fact, there is here a sort of miniature hydraulic apparatus, of which it is difficult to estimate the power. Probably several or all of these means to an end are coincident in their action, and combine, when called upon by the critical excitement, to secure the bursting of the ovisac and the propulsion of the ovum into the oviduct.

No description of the true ovisac can be better than the fol-

lowing, in the words of Dr. Farre:—'The second or internal coat, as it is commonly termed, of the Graafian follicle is the ovisac itself. It constitutes at first an independent structure; but receiving afterwards the before-mentioned investment from the ovarian parenchyma, the two coats unite to form the Graafian follicle. The ovisac is composed of embryonic fibres of connective tissue, of rounded cells or granules, and of a large proportion of minute globules. The embryonic fibre-cells lie parallel with each other, and, together with the granules, form the bulk of the tissue in nearly equal proportions. The oil drops are very numerous, and after the preparation has been under examination for some time, they are seen to float up to the surface of the drop of water in which it is placed, and to collect upon the under side of the glass disc used for covering it. In addition to these, there is found a small quantity of developed fibres of connective tissue,' with, as stated above, some small capillary vessels, 'which appear to give firmness to the whole. The Graafian follicle thus composed contains, in close contact with its inner wall, a stratum of nucleated cells, forming an epithelial lining, termed the *membrana granulosa*. The cells or granules which give a name to this membrane are so lightly held together, that it has been doubted whether the stratum which they form is really entitled to the denomination of a membrane. Nevertheless this structure appears to play an important part in regard to the ovum, which is always found lodged within a portion of it. At the commencement of the formation of the ovisac, according to Dr. Martin Barry, these peculiar elliptical nucleated cells or granules are nearly equally diffused through the fluid which it contains, the ovum lying in their centre. But about the time at which the ovisac unites with its covering or tunic to form the Graafian follicle, these granules are found to have become separated into little groups, leaving interspaces filled by fluid. Further, as this separation advances, the granules arrange themselves in such a manner as to constitute three distinct structures. The principal portion collects upon the inner surface of the ovisac, forming the *membrana granulosa* just described. A second portion becomes aggregated upon and around the ovum, taking its form and constituting a special investment for it. This is the *tunica granulosa* of Barry. A third portion collects to form a structure composed of a central mass, in which the ovum with its

tunica granulosa is imbedded, corresponding with the *cumulus* of Baer, and of certain cords or flattened bands, from two to four in number, which pass off from the central mass outwards, to become united with the layer of granules lining the follicle. These radiating bands or cords are termed by Barry the *retinacula*, from their supposed office in suspending the ovum and retaining it in its proper situation in the Graafian follicle. Besides these structures, the Graafian follicle contains a pellucid albuminous fluid, of a slightly yellowish colour, partially coagulable by heat. In this fluid float numerous granules, similar to those of which the parts just described are formed, together with a varying quantity of oil-like globules.

'Lastly, in the midst of the granules at an early period, and subsequently in that more definite arrangement of them which constitutes the *tunica granulosa*, is contained the ovum.' In the human ovary these follicles attain when mature an average size of about one-sixth of an inch.

The mature ovum taken from the ovisac is a round vesicle, in man about $\frac{1}{180}$ of an inch in diameter, covered with a layer of pedunculate cells, which, when compressed, give it a radiated appearance. These removed, the cell shows a perfectly hyaline membrane, enclosing yolk matter, and having the germinal vesicle attached to or near its inner surface. When compressed, the enveloping membrane exhibits the semblance of a transparent ring surrounding the yolk, and is called the *zona pellucida;* but only the relative thickness of the ovum cell wall is thus demonstrated. It is wholly structureless (except that there is every reason to presume analogically there must be somewhere an as yet undiscovered micropyle for the entrance of spermatozoa), but elastic, and, though comparatively tough, may readily be torn or incised. Another excessively delicate membrane is then discoverable, holding within it the yolk. In some ova this membrane may be detached by maceration in water for a short time. With the discharge of the yolk the germinal vesicle usually escapes. This is also a round transparent cell, which, when ruptured, gives out a minute quantity of clear fluid. It has in it or upon it—for it sometimes looks, when viewed in profile, as a globular projection—the germinal spot, *macula*, which too may, by careful manipulation, be broken and seen to collapse.

Escaping naturally from the Graafian follicle by dehiscence of the ovisac, the destination of the ovum is the uterine cavity by the ciliated route of the oviduct or Fallopian tube. But oftentimes, as always in some of the lower animals, the evacuation happens into the peritoneal space. The fimbriæ have not been accurately adjusted, and thus ova may be found in various directions adhering to the serous membrane, and occasionally even acquiring organic attachments. Usually, however, they deliquesce and disappear in the same way as happens in the tubes and uterus when no impregnation is effected. But it is a fact that abnormal development may proceed further, and give rise to dermoid and other kinds of cysts.

During the reproductive stage of ovarian life and its recurrent generative activity, there are certain coincident functional operations which take place in the accessary organs; and in the ovary itself the clearing out of the Graafian follicle leads to a series of structural changes.

In most of the lower animals the ripening and deposition of ova, or the ovipont, is of periodical recurrence. It is known as the œstrus, or season of rut; and it is at this time only that the female will submit to copulation, or that the ova are susceptible of impregnation. So long as healthy generative power lasts in woman something of the same kind occurs. At monthly periods, except during gestation and lactation, and in some torpidly responsive natures, there is an access of sexual excitement, with general turgescence of the pelvic viscera, and free secretion from all the mucous surfaces. The uterus and oviducts especially are congested, and the intra-utricular glands pour out a quantity of sanguineous fluid. The discharge of one or more mature ova from the ovary takes place during the continuance of this state. But here the correspondence between the phenomena in the human female and those of other animals is lost. For though true that impregnation may be effected while menstruation is going on, it is well ascertained that the fertilisation of the ovum usually happens some time after the flow has ceased. In most women there seems to be a persistent condition of sexual aptitude or avidity, and the power of conception is not limited to the catamenial period.

The greater number of ova escape the seminal contact or

influence. In this case the local exacerbation ceases, and no traces are left in the uterus of the abortive process, while rapid cicatrisation of the collapsed follicle ensues in the now quiescent ovary.

The appearances which this cicatrisation occasions are known as the *corpora lutea*. That following the exit of an ovum which does not become impregnated is less marked in its characteristics, and is said to be a false *corpus luteum*. Everything settles down quietly after failure of conception, inordinate vascular action subsides in the ovary, as in the other excited organs, and the wounded Graafian vesicle has simply to undergo the process of healing. Blood is effused into the cavity of the sac at the time of rupture, coagulates, forms a clot, and is enclosed in the collapsing tunics of the follicle. The true ovisac with its epithelial lining is thrown into puckered folds by the greater contractility of its outer layer, some fibrous exudation takes place, and the clot is closely packed in the centre. Transverse section shows the reddish mass of blood enclosed in the corrugated folds of the yellow layer from which the body derives its name; and this is surrounded by the whitish coat of the follicle in contact with the stroma of the ovary. But atrophic changes rapidly set in; the capillary vessels shrink, the mass of cells and their matrix membrane undergo fatty degeneration, and the clot disappears by absorption, so that, before the recurrence of another period, only a stellate cicatrix is to be found, retracted in the substance of the ovary.

On the contrary, when conception and pregnancy follow the deposition of the ovum, the ovary is involved with all the other associated organs in the state of nutrient energy, and although the new-formed *corpus luteum* is equally destined to obliteration, the event is delayed until some months after parturition. The morphological changes are for a time not decidedly retrograde. Active circulation goes on in the outer coats, and exfoliation of epithelial cells continues, so that the yellow convoluted layer thickens and encroaches on the central space, where the condensed clot becomes more or less organised. This state of abnormal nutritive effort attains its highest point about the fourth month of pregnancy. But though some small portion of young fibrous and connective tissue may be formed in connection with the coats of the ovisac, and thus render

the substance of the *corpus luteum* more compact and organised for a time, yet no true progressive structural development takes place. No new histological elements have presented themselves, and no new combinations of the tissues have resulted, so that all the apparent growth consists in the temporary hyperæmia of the original coats of the follicle, the elimination of a small quantity of embryonic structures in connection with them, the accretion of epithelial cells and fatty matter, and the partial metamorphosis of the central clot into a tissue of the lowest form of vitality—a sort of pseudo lining membrane for the cavity caused by its conversion. From this point nothing very different from the atrophic degeneration of the corpus luteum of menstruation happens; but the stages of retrogression are slow and prolonged to the end of pregnancy, or through the two or three earlier months of lactation, the variation evidently depending on the amount of conservative nutrient energy directed to the part. It may be understood from this physiological explanation of the origin and end of *corpora lutea* how these two successive conditions of imperfect nutritive effort and atrophic decay may, if misdirected or carried to excess, lead to various forms of disease, either of hypertrophic growth or malignant degeneration.

The only organ remaining to be noticed in connection with the ovaries is the *parovarium*, which, though only discovered by Rosenmüller at the beginning of the century, may readily be distinguished in the fold of the broad ligament, between the ovary and the Fallopian tube, as a series of tubules diverging from the hilus of the ovary. They do not open into the ovary, contain only a small quantity of clear fluid, and have no excretory duct. This organ is a development of the blind pouches of the Wolffian body of the embryo, the original excretory duct having disappeared during the transformation, or conserving only its terminal expansion. The duct of Müller is converted into the Fallopian tube, its bulb sometimes remaining as a pedunculate cyst, depending from the mouth of the infundibulum. Other so called hydatids are more rarely formed at a later period from the atrophied tubules of the parovarium, and when of large size, and much distended with fluid, have been described as cases of dropsy of the broad ligament.

CHAPTER II.

MORBID ANATOMY AND PATHOLOGY OF THE OVARIES.

Abdominal and pelvic tumours connected with the female organs of generation are of many kinds, but those which especially implicate the ovary may be reduced to three classes: 1st, the adenoid tumours, composed of gland structure in variously altered conditions; 2nd, tumours of a fibrous character, the result of growth from the connective tissue of the organ; and 3rd, those tumours which assume a malignant form, and are essentially degenerations or new formations. Other cystic tumours are found in the neighbouring organs, sometimes complicating the diagnosis of ovarian tumours, and requiring nearly the same management and operative measures. To show their analogies and relations, all of these may be grouped in the following manner:—

OVARIAN TUMOURS.

1. *Adenoid*:—*a*. Simple cysts—enlarged Graafian follicles.
   b. Multiple cysts—cysts in apposition becoming multilocular.
   c. Proliferous cysts—parent cysts with secondary cysts growing from the interior of cyst wall.
2. *Fibrous*—Growth of stroma of ovary.
3. *Malignant*—Cancer, tubercle.

EXTRA-OVARIAN TUMOURS.

Cysts of Fallopian tube and terminal vesicle.
Cysts of broad ligament or vesicles of Wolffian body.
Cysts developed from tubules of parovarium.
Cysts developed from aberrant ova attached to the peritoneal surface.

But for descriptive purposes, and in order to discuss more consecutively the necessary remedial procedures, it will be better to arrange the simple cysts in two classes:—

1. *Ovarian*—Enlarged Graafian follicles.
2. *Extra-Ovarian*—*a*. Cysts of Wolffian body.
   b. Cysts of Broad Ligament.
   c. Cysts of Fallopian tubes.
   d. Cysts developed from aberrant ova.

The compound adenoid tumours also fall into two divisions:

1. *Multiple*, consisting of cysts aggregated together.
2. *Proliferous*, or parent cysts, filled with cysts of secondary growth:—

leaving for after consideration the tumours arising from fibrous and malignant growths.

Simple ovarian tumours.—The simple, or unilocular ovarian cysts are organised sacs, containing fluid, which grow from some part of the ovary itself. They commence their growth as small vesicles, but no limit can be mentioned as to their ultimate size, except that of the containing power of the abdomen, and the extent to which the abdominal walls may be distended. As they enlarge and press upon the viscera in contact, enough irritation is generally set up to lead to the formation of bands and layers of attaching tissue. Often, however, so little local disturbance attends the increase of the tumours that they reach the size of the gravid uterus without any adhesions.

The walls of even these enormous sacs are after all, in their simple forms, only the continued growths of some of the original ovarian tissues. No new elements are superadded. There is only a surplus of material, malarranged, and out of place. At their first stage of development into cysts, they are to be seen with one part projecting from the surface of the ovary, the remainder being imbedded in its stroma, or enveloped by its fibrous tunic. The coats are then thin, membranous and translucent, and not in any way to be distinguished from the natural structure of a Graafian follicle. With growth comes greater thickness, opacity, and firmness. The delicate membrane of the vesicle has changed into a layer of fibrous tissue, with its full complement of nerves, arteries, and veins; the epithelial lining is more marked from abnormal reproductive activity in the cells, and an ultimate tendency to irregular

formations; and the peritoneum remains always recognisable as the outer investment. The peritoneum is extremely attenuated, and cannot easily be detached, but retains its delicate pavement epithelium. The interior has also sometimes the smooth glistening appearance of a serous membrane, with similar epithelium, interspersed here and there with groups of a few stalked and ciliated cells. Naturally the most distant unattached points of the sac are the most yielding, and become thinner than the other parts. There is no uniformity of thickness, which in different cases, or even in the same tumour, may vary from an inch to the extreme bursting point of tenuity. The histological elements of this coat are identical with those of ordinary fibrous tissue, consisting of fibres very difficult to disentangle, nucleated fibre cells and granules. The form of the tumour, of course, mainly depends on the elasticity of this layer, and when freed from pressure assumes nearly that of a globe or egg, with bulgings irregular according to the density or yielding disposition of the several parts. Though as a rule receiving an abundant supply of blood for nutrition and growth, the inevitable stretching and pressure from the accumulation of fluid, and consequent interference with capillary circulation, give this tissue a proneness to structural degeneration, and it may become softened by fatty transformation or indurated by earthy deposit. The vessels which supply it enter at the base, enlarge with its growth, and ramify very freely on its inner surface. They form a complex net-work in and under the peritoneum, and the capillaries passing into the fibrous layer traverse it, and have a peculiar arrangement on the inside, where they form knots of anastomosis with bulbous dilatations and terminal pouches, like but less regular than those found in the chorion. They undergo many changes, and are often atrophied and completely obliterated, and replaced by successive fresh formations. The consequence of this is, that there are incessant irregularities in the circulation, with stagnation and capillary embolism. The decomposed blood yields a deposit of granular hæmatoid matter and cholesterine, of a yellow colour, which tinges the tissue and gives it a brownish or tawny appearance on section. Outside, under the peritoneal covering, the course of numerous large and tortuous veins is to be traced plainly, and they often acquire considerable volume. Nerves,

sometimes of large size, pass with the vessels into the substance of the coats, but their mode of termination has not been made out. The lymphatics, also, are in some cases developed much beyond their ordinary volume.

The simple ovarian cysts generally originate in a Graafian follicle, either before or after its rupture. The theory that the whole energy of the developmental process in the follicle is confined to the delicate germinal vesicle, and that the first impulse to the formation of a morbid cyst is caused by the destruction of the germinal spot, and the involution of the Graafian follicle, does not furnish a sufficient explanation of every case. Rokitansky and Ritchie found the ovum in ovarian cysts larger than an ordinary mature Graafian follicle, which proves that the vesicle need not become obsolete in order to degenerate into a cyst; and simple cysts of corresponding character are sometimes met with in the ovaries of new-born female children. The mere presence of an ovum, however, is no convincing proof that a follicle has not become obsolete. But without excluding this as one cause of the formation of ovarian cysts, others must also be sought for among the changing conditions of the organ. Probably, accidental hæmorrhage into a follicle approaching maturity and in its most active stage of formative power, may tend to morbid enlargement.

Rokitansky has demonstrated that cysts may be developed from a corpus luteum, or from a ruptured follicle of which the involution has been arrested. His description of such cysts is in these words:— 'The cyst is always lined with a stratum thicker than the wall of the follicle itself, which adheres to it either very loosely by a delicate areolar tissue, or very intimately by a dense connective tissue. This lining stratum is of a dirty white colour, and has a rough inner surface. It may be recognised as the yellow layer of the corpus luteum which has been rendered thinner by expansion, and the roughness of its inner surface is occasioned by some of its remaining folds.' The liquefaction of the fibrinous clot in the corpus luteum may also give rise to a cavity, which will be found covered with secreting cells, and may afterwards enlarge so as to have a cystic form.

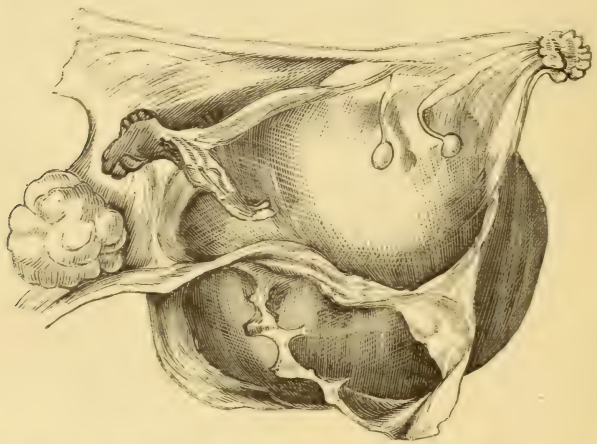
If hyperæmia is to be taken into account as operative in the production of cystic degeneration, it must not be forgotten

that this condition also occurs in the normal physiological enlargement of the follicle and its final rupture. Scanzoni's explanation appears well founded, when he points out that a thickening of the cell walls must necessarily take place previously, if the rupture which usually follows hyperæmia is to be prevented, and the follicle degenerate into a cyst. A more considerable thickness of that follicular wall is, according to Scanzoni's view, either a peculiar malformation of the ovarian tissue, or the sequel of hyperæmia which has caused abnormal deposition of the lining membrane of the follicle. Julius Klob frequently examined simple cysts of the ovaries in new-born children and young girls, of which he gives the following account. In these ovaries there are either cysts with homogeneous, serous, fluid contents, or the so-called hæmorrhagic cysts, that is, follicles expanded to thin walled cysts from extravasation of blood. Schulze found the ovarian stroma in a child born in breech presentation degenerated to an extensive network, completely filled with blood, both fluid and coagulated, and so forming a simple cyst. In two cases mentioned by Klob, the capillary vessels of the follicle were completely atrophied, leaving in the one case on the inner surface a delicate tracery, the remains of the obliterated vessels, and in the other stains of a dark red or blackish colour from the decomposing blood. Grohe advances an explanation of the phenomena. He maintains that there are two vascular systems in the ovary, independent of each other; one set being the nutritive vessels of the organ, the other merely subservient to the growth of the follicles, and ceasing to exist as they ripen and burst.

If this be true, it may be seen how under certain conditions this functional, exclusively follicular, set of vessels may become obliterated after having reached a given point of development, the generative life of the follicle may cease, and its tissues fall under the influence of the simple nutritive action of the part, which, by thickening the walls and increasing the quantity of secreted fluid inside, at once converts the follicle into a cyst. Occasionally, too, Graafian follicles are so deeply seated in the structure of the ovary, that though the ovum is fully formed and ready for impregnation, there is no possibility of its escape by rupture; and its unwonted presence in such a

position may give rise to morbid action. With great local congestion there is also the possibility of intra-follicular hæmorrhage, and cysts are found in adult ovaries distended in this way to a considerable size. The same thing on a smaller scale has happened in children and the fœtus, and so given the conditions for cyst formation. Besides this, the localised inflammation of a single isolated follicle may be the cause of cystic degeneration. The true ovisac can often be turned out from the external coat of the follicle, but a cyst once formed is not to be separated from its attachments without dissection.

Simple extra-ovarian tumours.—The annexed drawing, from a specimen in my possession, which I removed from a patient who had a large cyst of the opposite ovary, shows remarkably well the character of these extra-ovarian cysts, or cysts of the broad ligament.



The simple extra-ovarian tumours found upon the broad ligament are commonly either cysts arising from the tubules of the parovarium, or expansions of the terminal bulbs of the Wolffian organ. These vesicular bodies, which are seen pendent near the fimbriated end of the Fallopian tube, or from the spreading part of the broad ligament, sometimes fill with fluid till they reach the size of a nut or an egg. They are described in reports of post-mortem examinations, made for other purposes, as having thin walls covered with peritoneum, no adhesions, clear contents, and small canular pedicles. The thinness

of the walls and the slenderness of the pedicle will account for their often bursting or falling off before giving any symptomatic trouble. But the dilatations of the tubules of the parovarium which have led to the use of the term dropsy of the broad ligament, and which end in the development of true cysts, are not at first so strictly pedunculated, and have an internal lining of pale cylindrical nucleated epithelium, corresponding with that found naturally in the tubules. They cause comparatively little constitutional disturbance, and are not rapid in their early enlargement. But by accidental production of fibrous tissue in the coats of the sac, the chances of bursting are diminished, and they occasionally grow to a large size; in fact, some of the very voluminous cysts on record were found to arise from some part of the broad ligament.

The following is an illustrative case:—A lady, aged twenty, had observed an increase of size as far back as 1862, but continued quite well till three months before I saw her in August 1863, when the existence of an ovarian tumour had been suspected only for a few weeks. The girth at the umbilical level was thirty-four and a half inches, the distance from the ensiform cartilage to the pubic symphisis fifteen inches, and from the ilium to the umbilicus on the right side nine inches; on the left, eight. The abdomen was occupied with a fluctuating tumour, which extended upwards two or three inches above the umbilicus. There was no crepitus, and no tenderness on pressure. The uterus was far backwards, a little to the left, and freely moveable; the right side of the vagina was depressed, giving rise to the impression that the connection was with the right side of the uterus and rather close. The disease gave so little uneasiness, that all interference was postponed till March 1864, when the increase had been rapid, from seventeen to nineteen inches across the front of the abdomen, while the vertical measurement still remained fifteen inches. The cyst was then removed and the adjacent ovary along with it, as it felt hard and appeared larger and more corrugated than is usual in unmarried women; though, from its being quite apart from the tumour, it would have been easy to remove the cyst and leave the ovary. The pedicle was not thicker than a finger. Another cyst the size of a walnut in the left broad ligament near the ovary was laid open and emptied. Dr. W. Fox, after exami-

nation of the cyst, reported it as 'when distended about twice the size of an adult head. The Fallopian tube flattened out is seen to course along its external surface. The fimbriæ are, however, non-adherent and distinct. The ovary is found in a fold of the broad ligament, distinct from the tumour, and presenting the natural appearance. It contains no cysts. The cyst itself has a smooth external wall. It is lined internally by a flattened polygonal epithelium. No villous or papillary growths can be discovered on its inner surface. This was of a delicate rose colour. The cyst was injected with carmine, but the arrangement of its vessels presented nothing remarkable. The vascularity of the cyst was not very great. No other cysts could be found in the broad ligament.'

There is another form of extra-ovarian simple cyst, described by Huguier under the title of 'serous cysts on the exterior of the uterus.' The seat of their development appears to be the tissue connecting the peritoneum to the uterus, and for the most part they are found on the back of that organ. They sometimes grow as large as an orange, but are commonly of insignificant size. The attachment to the uterus is broad compared with the bulk, but in some cases the cyst elongating acquires a distinct pedicle, and being freely mobile, may easily be mistaken for a similar cyst arising from the broad ligament or ovary. They have no specific characters indicating their mode of origin, and are not known to have occasioned more than mechanical inconvenience. Other diseases of the uterus or ovaries have existed at the same time. In a case given by Madame Boivin there was induration of the neck of the uterus, a fibrous tumour protruding into the cavity, and a cyst in each ovary. Another described by Huguier had a fibrous tumour in the anterior wall, general hypertrophy, two mucous cysts in the neck, two cysts in the left ovary, one in the corresponding Fallopian tube, and seven smaller cysts in the broad ligament of the same side. The women with one exception had borne children, and in all of them were evident traces of recent or ancient inflammation.

The fact that ova discharged from the follicle sometimes never reach the uterine end of the Fallopian tube, or, missing it altogether, become aberrant, and attach themselves to some point of the mucous or peritoneal surface, where they

undergo changes, acquire vascularity, and reach a certain size before they finally submit to extinction, leads to the supposition that in particular cases the irregular development may be prolonged, and there being no generative impulse, all the nutritive energy may concentrate on the formation of tissue sufficient for cell walls and the exudation of fluid. Boinet writes thus :—

'Maintenant, nous appuyant sur tous ces faits, sur les phénomènes physiologiques de l'ovulation et de la fécondation, ne peut-on pas admettre qu'il se passe, pour la formation des kystes de l'ovaire, ce qui se passe pour les vésicules fécondées? celles-ci se développent quelquefois dans l'ovaire lui-même, ou dans la trompe de Fallope, ou dans la péritoine, ce qui constitue des grossesses anormales. Eh bien, ne peut-il pas arriver que l'ovule non fécondé, mais devenu malade par suite de toutes les causes que nous venons d'énumérer plus haut, puisse se développer pathologiquement soit dans l'ovaire où il reste fixé, soit dans la trompe de Fallope où il s'est introduit, comme au moment de la fécondation, soit enfin dans la péritoine, où il est tombé?'

Tubo-ovarian cysts.—The tubo-ovarian cysts have an interest peculiar to themselves. They were first described by Ad. Richard and Dr. Labbé as Kystes-tubo-ovariennes. The case reported by Blasius in 1834 as Hydrops Ovariorum proflusus belongs to the same class. Rokitansky and Klob found in several instances the distended end of the Fallopian tube connected with and opening into a cavity within the ovary. The walls of the cysts therefore were formed jointly by the tubes and the ovarian stroma. The ovarian portion of the cyst-walls possessed either reticulated or smooth, yellow, yellowish red, or russet coloured lining membrane which did not continue into the tubal part of the cyst. The distal third only of the tube was dilated, and the middle third hardly ever showed in the formation of the cyst. Richard only observed the middle third to be implicated, in which case the fluid of the sac passed freely into the uterine cavity. But in the case mentioned by Blasius there were nearly similar conditions. The junction of the tubal end with the rest of the cyst is marked by a slight constriction, or is sometimes indistinct. In one case Rokitansky found the cyst wall at that point partially thinner, as if about to sever.

The genesis of such cysts is explicable. The pigmented portion of the cyst wall represents the yellow layer of a corpus luteum. The fimbriated extremity of the Fallopian tube had been embracing that portion of the ovary where the rupture of a ripe Graafian follicle was imminent, during a catamenial period. Instead of retracting, the fimbriæ remained adherent to the ovary, excessive secretion of fluid followed, and a cyst was formed. It is curious that in such cases the dilatation takes place most rapidly in the ovarian portion of the cyst, though it might have been expected that the tubal walls would have yielded more readily to the pressure of the fluid. The rupture of an ovarian cyst previously formed in a corpus luteum is a very probable occurrence. Richard has observed two such cases.

Boinet has published the following account of the case of a young married lady, which is evidently that of the formation of a tubo-ovarian cyst by the bursting of a Graafian follicle into the adherent tube :—'Quelques mois après sa dernière couche, et à la suite d'excitations démesurées, et contre nature, la douleur de l'ovaire devint plus vive, et tellement vive qu'elle eut tous les signes d'une péritonite locale. L'ovaire se tuméfia considérablement, et offrit bientôt le volume du poing ; il était tendu, très-douloureux à la moindre pression ; tous les signes d'une ovarite aiguë existaient au plus haut degré, et je craignais ou la rupture de l'ovaire, ou la formation d'un abcès dans la fosse iliaque. L'état général était des plus mauvais ; il y avait une fièvre très-forte, des frissons, des vomissements ; tout faisait craindre une terminaison fâcheuse. J'avais pris toutes mes dispositions pour ouvrir ce prétendu abcès, lorsqu'on vint m'annoncer qu'il s'était rompu dans la nuit, et qu'il s'était écoulé par le vagin, plus d'un litre d'une matière aqueuse, glaireuse, ayant laissé sur le linge des traces semblables à celles du sperme. Tous les symptômes d'inflammation et les douleurs disparurent promptement ; mais depuis cette époque, qui date de trois ans déjà, il s'écoule constamment par le vagin une liqueur aqueuse plus ou moins abondante, mais qui augmente à certains moments, lorsque la malade s'abandonne à son vicieux penchant.'

Some years ago I saw a lady in consultation with Mr. Arthur, of the Commercial Road. She had a large cyst in the

abdomen, which we believed to be ovarian, and I went one day prepared to tap her, when I found that discharge of serum had suddenly come on from the vagina some hours before, and was still continuing, while the abdomen was manifestly diminishing in size. The fluid had very much the character of the liquor amnii, and, on introducing a speculum, Mr. Arthur and I both saw it very distinctly coming out of the os uteri, and along the speculum. The discharge continued for several days, the abdomen regained its natural size, the lady recovered good health, and there has been no re-appearance of the cyst, which was assuredly one made up by the union of the tube with an ovarian cavity.

A case which occurred in the practice of Mr. Anderson, of York Place, furnished ocular demonstration of this tubo-ovarian form of tumour. A woman with symptoms so urgent as to require tapping sent, on the day fixed for the operation, to say that she was passing such a quantity of urine that all her distress had vanished. At the visit it was found that the discharge still continued. It proved to be, as Mr. Anderson writes, 'simply highly albumenised serum, with cholesterine plates. The case went on, the woman's size lessening till she gained flesh again. After some six months she died from a sudden outburst of haemoptysis. On post-mortem examination, a large empty cyst, with thick walls, and including some lesser cysts, was found lying collapsed and loose in the belly. The cyst on being slit open, where the escape had taken place became immediately obvious, and a good-sized staff (No. 10 or 11) passed with the greatest facility along one of the Fallopian tubes into the uterus and vagina. The parts were sent to the College of Surgeons, and now lie hidden and undiscoverable among the mass of accumulated specimens.'

The following case of tubo-ovarian cysts recorded by Dr. L. Beale in the 'Pathological Transactions' for 1867–8 is curious:—The patient, a married woman, aged thirty, died under Dr. Beale's care in King's College Hospital, of chronic renal disease. For the last year of her life she had not menstruated; there was no history of any uterine affection; and she had never been pregnant.

After death two tumours were found in the pelvis, one on each side of the uterus: the left one was circular, about the

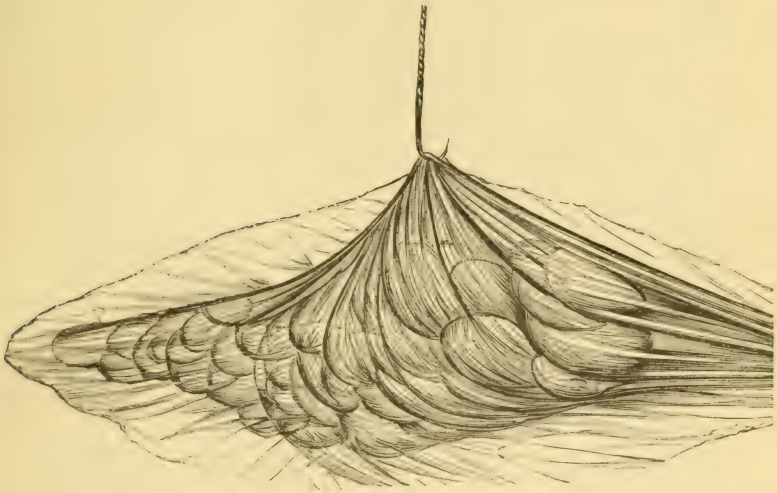
size of a small orange, and distended with fluid; on its upper and inner surface was seen a tortuous but not uniformly dilated canal, which was closed at the uterine end, but opened freely into the larger cyst at its ovarian extremity; this was the uterine portion of the Fallopian tube, while the cyst was the dilated fimbriated extremity. The tumour on the right side was smaller; and the inner portion of the tube was uniformly dilated into a canal, one-third of an inch in diameter; like the one on the other side, it communicated with the cyst by a smooth circular opening.

On each side the inner constriction was just outside the uterus, where the tubes seemed to be merely fibrous cords; externally the fimbriated extremities were also closed and dilated into roundish cysts. Each cyst had thin walls with fluid contents of a dark-brown colour. The left ovary could not be seen; the right ovary was flattened out and lying in the wall of the cyst, but not communicating with it. No traces of ovarian structure were left, but a mere cyst with semifluid contents of a chocolate colour.

The uterus was quite normal in appearance; but no distinct opening could be seen at the fundus, where the tubes generally enter; outside, the peritoneal surface was normal, nor were there any adhesions showing previous inflammation.

Multiple ovarian cysts.—Every tissue and organ, however healthy, has a propensity, under given stimulation, to an abnormal reproduction of itself. There are tumours of every form of tissue, modified by the various conditions of nutrition; and outgrowths of compound gland structure are equally common productions. The ovary, instead of being an exception to the rule, is perhaps one of the greatest transgressors in this respect. Some physiological perversion occurs in the natural career of a Graafian follicle; it fails in the evolution of an ovum, but it succeeds as a monster cell-growth, and becomes a simple unilocular ovarian cyst, the simplest form of adenoid tumour. Two or more Graafian follicles do the same thing simultaneously; they abort, grow side by side, fill with fluid, become an enormous assemblage of similar units, disfiguring and stimulating each other by pressure and reflex action, forming preternatural adhesions within and without, and at length, by their very

excess of development, inducing in their component tissues the inevitable process of involution, and in the organised being to which they belong a lingering decay and death. In



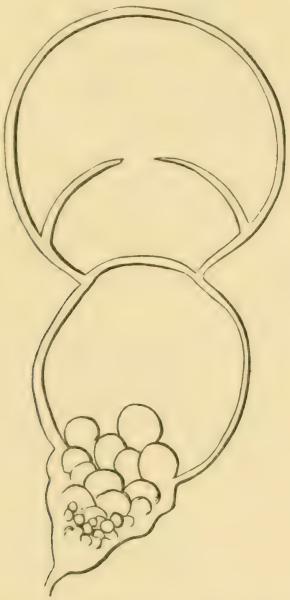
this is recognisable an adenoid tumour of the true type and tendency, aggressive and destructive, though not essentially malignant. Gaining a certain size, however, it generally happens that one out of the many dropsical follicles takes the lead of the rest. Annihilating some of its neighbours, it dwarfs others, lessens their vitality, vitiates their contents, and fills more rapidly than they. And this struggle for existence seldom goes on long without destroying their integrity; pressure and expansion cause obstruction to the circulation in the cell walls. Atrophy and absorption are the natural consequences, and the boundaries being wholly or partially gone, or represented only by bands or bridges of membrane, the adjacent cells communicate, and the tumour assumes what is called the multilocular form. This process of excavation may even go further, till all the cavities become continuous, or, with a total clearance of every partition, the cyst remains only one-chambered. These transformations cannot be called capricious, but they are unaccountable, since they are found taking place at an early period in some small tumours, while others of large size preserve their multiple vesicular character

intact. The elementary tissues of these composite cell walls are much the same as those constituting the unilocular cysts, but the nature of the contents of the several loculi varies almost indefinitely. Liquidity, consistence, colour, and chemical composition may be different throughout. One cell may contain nearly solid matter; the next a limpid fluid; in one may be pus, in another serum without any trace of cell formation; there is union in the mass, but no uniformity of action in the parts, and the growth having overstepped the bounds of healthy influences comes to ultimate destruction by the irregular play of a series of morbid changes.

Undoubtedly, too, there are cysts formed in the ovary as in other organs, quite independently of the advanced Graafian follicles. Bursæ are soon produced under the skin by mere friction; and the accidental presence of any foreign body in a tissue, such as crystallised matter or exuded fluid, or the stimulation of some immaterial irritant, may cause the formation of cyst walls. And, once organised, they are capable of rapid augmentation of volume or multiplication. There are often discovered, in examinations of the ovary, cysts which bear no relation to Graafian follicles or corpora lutea, but which seem to have originated in the deep areolar tissue, or among the vessels of the gland. They may have commenced as tiny deposits of fluid in some one of the areolar spaces, about which condensation of the surrounding tissue would soon take place, with the speedy production of a limiting capsular membrane, channelled out with capillary vessels; or it is allowable to retreat a step further for explanation, and fall back upon the easily-roused innate power of evolution of the plastic nuclei and cells of the tissue.

Proliferous cysts.—An ovarian adenoid proliferous tumour is a parent cyst filled with its progeny of endogenous cysts, or surrounded by others of exogenous growth. It may have the same origin as other cysts, and its early condition would be that of a common unilocular cyst. In fact, any epitheliated cysts may become proliferous, and they are found in all parts of the body. But wherever they are, they have, when filled up, the same complex appearance to a casual observer, and seem equally to defy description or comprehension. When cut open, the interior is seen to be choked up with other cysts,

growing from all sides, crowding and pressing each other out of shape. From the outside of these secondary cysts others grow, and the same outgrowth may be again repeated upon them. So too, if these inner cysts are opened, another endogenous series may be disclosed within, and the budding does not necessarily stop there.



Want of space and failing vitality only, either in the patient or the part, put an end to the process. A through section gives to view a space circumscribed by the cyst wall, irregularly areolated, with the membranous septa impinging upon each other at every conceivable angle, and pourtraying the outlines of the interspaces and loculi with lines as fantastic as the territorial boundaries on a parish map. The thickness of the walls generally keeps pace with the growth of the cysts, the little ones looking only like distended bladders; but a small additional growth yields fibrous tissue, with vessels entering the pedicle and ramifying everywhere. The internal surface has epithelium, and often looks flocculent when the layer is not very fine.

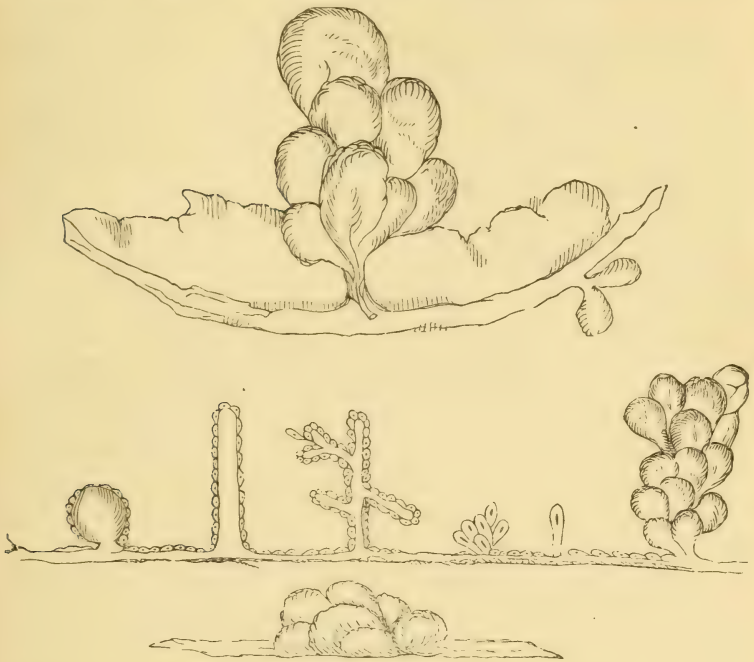
But proliferous cysts have degrees of fertility. Some breed

to suicidal repletion ; others fill with fluid and nourish a few clusters, or only a single symmetrical cluster of secondary cells, which have room enough and to spare, and hang pendent in the cavity. Now and then only one solitary bud indicates the self-multiplying tendency of the parent cyst.

It is in these simple cases that the mode of development can be studied, and here is revealed the clue to the problem. The Graafian follicle is a proliferous cell. It is lined with epithelium. In course of time, one of these cells, a sort of queen cell, probably the developed nucleus of the cell originally formed in the *couche ovigène*, makes a fresh start in life, increases in size, fills out to roundness, and feeds its own nucleus till it becomes conspicuous as the germinal vesicle. This again reproduces its like within itself, the germinal spot, another cell. At this point this triply involved cell awaits the spermatic influence to deviate into a new career and to commence the generation of a new set of cells, endowed with the novel formative properties necessary for the building up of tissues the same as those of the being from which it sprang. But this fecundating influence not arriving, it falls the prey of involution, softens, dwindles away, and melts down out of sight among the rest of the ejecta. This is what happens in the healthy Graafian follicle. But suppose the Graafian follicle is injured or some morbific influence taints it, and the ovum is blasted, the vesicle then takes on a cystic form and enlarges. It is still lined with epithelium, and that shares with the rest of the structure the evil impression. Some individual cells distinguish themselves by eccentric shapings ; they elongate, form a pedicle, and show their nuclei. After a time they throw out a pouch-like projection, which lengthens, grows as it were on a stem, and is nucleated too. Groups of cells sometimes act together in the same way. Or it may be that a cell becomes columnar, or ramifies, and assumes dendritic forms, budding after a like fashion. In the case of their having plenty of space and abundant nutriment, they elaborate a fibrous coat, with capillary vessels, push on symmetrically, and hang into the cavity like a close set bunch of currants.

Intensify the growing power sufficiently, and a proliferous cyst is soon filled with progeny, and presents the complicated aspect first described. But, as all these secondary growths throw

out successive generations of epithelium on both their surfaces, equally with the parent cyst walls, the cells lying upon them are liable to, and do, undergo the same changes and develop-



ments as the cysts they crop out of. Two modes of the increase of the tumour are thus evident—the reproduction of new cells with cystic tendencies, and repeated gemmation from the newly formed cells and cysts.

Yet another complication of these proliferous cysts presents itself. Some parts of the cell walls have in them the same plastic elements which form the *couche ovigène* of Sappey; and these may be roused into activity. They grow, and grow as they were designed to grow, into Graafian follicles, containing ova. The demonstration of this, as a fact, was first made by Rokitansky, who published his discovery in the year 1855 in the 'Wochenblatt der Zeitschrift der KK. Gesellschaft der Aerzte zu Wien,' where he describes the appearances observed in a woman, twenty-six years of age, who died of diseased ovaries. Both ovaries were affected. The tumour on the right

side was as large as a child's head, that on the left as large as a man's fist. Both ovaries were composed of a number of cysts as large as a cherry, which, for the most part, lay closely packed together, here and there became flattened by mutual compression, and occasionally were projected into each other. The surface of the tumours was thus slightly lobulated, and between the protuberances were seen, at intervals, cysts as large as a barley-corn, a pea, or a bean. These latter cysts on being punctured gave exit to a greenish-coloured fluid, containing membranous flocculi, and in all of them the ovum was found. In each of them, however, the ovum was softened, very dull-coloured, and easily disintegrated. The zona pellucida had for the most part lost its sharp contour, and, except in one case, no germinal vesicle was discoverable.

Subsequently, in the year 1864, the late Dr. Charles Ritchie had the opportunity of seeing the same thing in the ovaries of a married woman, fifty-four years of age, who was sent to me in December, 1863, by Dr. Whitehead of Manchester, on account of ovarian disease. She was admitted to the Samaritan Hospital late in May, 1864, and ovariotomy was performed on June 2. The pedicle of a non-adherent tumour, larger than an adult's head, on the right side, was secured by a clamp about three inches from the uterus, and the cyst cut away. A second cyst, nearly as large as the first, was then found on the left side, which was also tapped and emptied. The pedicle of this second cyst was transfixed, tied with strong silk in two halves, and secured to the clamp on the other pedicle after the cyst was cut away. Recovery was uninterrupted, except by a superficial abscess, which formed beside the lower angle of the wound.

The two tumours were examined directly after their removal by Dr. Ritchie, who pointed out to me in each of them a number of small cysts, which were evidently enlarged Graafian follicles. Knowing the great and long familiarity which Dr. Woodham Webb has had with the ova of various species of animals, since his researches in conjunction with Barry, I asked him to examine some of the cysts, in order to ascertain whether they did or did not contain ova—knowing that upon this point no higher authority could be appealed to. As one friend has suggested that we may have mistaken a *blood corpuscle* (!) for an ovum, there was evidently some reason for my caution ; but

I trust that the following note from Dr. Webb will set all such doubts at rest:—

'Both the tumours you sent to me, after their removal from a woman fifty-four years old, were growths in excess of true ovarian structure. The multilocular character was produced by clusters of ovisacs of various sizes. Ova, with the other natural contents, were to be found in all the small sacs. The fibrous coats of the larger sacs were thickened, and had many secondary sacs developed in them. The interior was lined with epithelium, which in some instances had, by parthenogenetic enlargement and successive buddings of the cells, given rise to bunches of grape-like growths—repeated generations of imperfect ova. The whole, therefore, was nothing more than a reproduction in the human subject of conditions which are natural in some of the lower creatures.'

The preceding woodcut illustrates the mode of growth of these epithelial structures.

This drawing represents one of the Graafian follicles on the internal surface of the cyst, opened, and the ovum and other contents flowing out.

As this discovery is of importance in the history of ovarian pathology, I add a letter from Dr. Ritchie, which was published in the 'Medical Times and Gazette,' August 6, 1864. He

says: 'Before and since the particular observation referred to, I have been struck with the probability of many so-called ovarian cysts being actually due to degeneration of the ovum itself. In one ovarian tumour, which, through Mr. Wells's kindness, I had an opportunity of examining, I found a number of thin-walled bladders, varying from the size of a cherry to that of a large plum. These bladders were easily enucleated from the fibrous stroma which surrounded them, and there could be no reasonable doubt that they were Graafian follicles somewhat distended by over-secretion. The interior of these cysts was searched in vain for the ovum, but I was much struck with the fact that in the great majority of them the cyst wall was thickened at one point, and at one only, and that on making a section through that point a small secondary cyst was discovered. No doubt it will be said that at this point endogenous growth had commenced, but it is a significant fact that there was only one such growth to each follicle, and that it lay imbedded in a thickening of its inner coat. What can be more probable than that it was the ovum lying imbedded in its cumulus proligerus? We know that every ovum, whether it be fertilised or not, undergoes certain definite changes on arriving at maturity. . . . . Those changes have, as far as I am aware, as yet only been observed while the ovum was contained in the Fallopian tube; but it certainly is perfectly conceivable that in those cases where ripe follicles fail to burst, the matured ovum should undergo its wonted metamorphosis while still contained in its ovisac. Nor is it absurd to suppose that under those altered circumstances the progressive dilatation of the blastodermic vesicles should occasionally exceed its normal limit, and go on to the formation of a cyst which, in structure and position, would exactly correspond to the little secondary cavity which was seen in the wall of the enlarged Graafian follicle.

'I cannot think, however, that the ovum always stops short at this early stage of its development. Its constant tendency is towards the formation of a new animal, but when deprived of the stimulus of the spermatozoon, it constantly falls short of its aim. Perhaps it may go on to the production of what, were it found in the uterus, would be styled a grape-mole; perhaps other forms of cystic degeneration may be more frequent.'

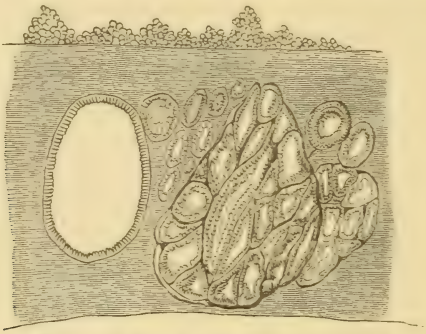
In Dr. Ritchie's work on 'Ovarian Physiology and Pathology,' published 1865, the following passage appears, p. 197. It shows that he perseveringly continued his researches, and that his industry was not then less rewarded than there is every reason to hope it would have been in other ways, had his career not been stayed by death just as he had gained the impetus of success. 'Since last August, 1864, I have succeeded in finding ova in some of the loculi of a large number of ovarian cysts. Some of the ova were perfect, with a sharply defined zona pellucida, a germinal vesicle and a germinal spot; others were more or less imperfect, many having the appearances mentioned by Rokitansky. I have never found an ovum in a loculus larger than a cherry, and never in a loculus which contained jelly-like contents.'

Among the many pathologists who have investigated this difficult subject, one of the most recent and painstaking is Dr. Wilson Fox, whose laborious observations deserve special notice. In a communication to the Medico-Chirurgical Society, read June, 1864, he has expressed an opinion that all the forms of cysts met with in the ovary originate from the Graafian follicles, and that the multilocular forms are not the result of any special degenerations of the stroma of the ovary, but are due to secondary formations from the interior of parent cysts. He has studied the modes of formation of the secondary cysts thus formed, and has divided them into three classes:

The first and most frequent manner in which secondary cysts are formed (occurring in ten out of fifteen specimens) is the result of the production of a series of glandular structures, presenting a tubular type, on the inner wall of the parent cyst. Dr. Fox describes the mode of formation of these glands as differing from those of other glands, which for the most part originate in the embryo as diverticula from surfaces. The process in this case commences with a stratification of the epithelium, into which project papillæ formed of the stroma of the wall of the parent cyst, each papilla carrying a delicate vascular loop. Villi more or less densely clustered are thus formed, which may persist as such, and then, according to Drs. Wilks, Friedreich, and Luschka, may become covered with ciliated epithelium; but in a large number of cases they become converted into tubular structures by the upward growth of the stroma

around their bases. Cysts may be formed while they are thus situated on the surface, from the occlusion of their orifices by mutual pressure; but most commonly the growth of the stroma, by which this tubular character was first determined, continues until they are completely imbedded in the wall and covered by a fresh layer of the stroma, the surface of which may again become the seat of a new and similar growth of glands and villi. Masses of glands thus imbedded are dilated into cysts by their own secretion, and form the small semi-solid masses which project into the interior of the parent cysts, and in them similar processes may be repeated indefinitely. Dr. Fox believes that he has traced in the variations between the relative growths of the stroma and these glands, which I have described in the Transactions of the Pathological Society, vol. xiv. p. 205, as Fibro-Epithelioma, or 'Alveolar Adenoid Tumour,' the source of those varieties in the density of these masses which have given rise to the

Tubular glands partially enclosed in stroma.

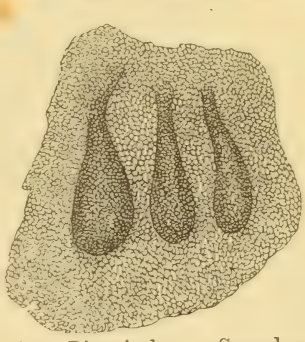


Cysts and Compound Masses of Glands, which are capable of expanding into Loculated Cysts, imbedded in Wall of Parent Cyst. (×150 Diam. reduced.)

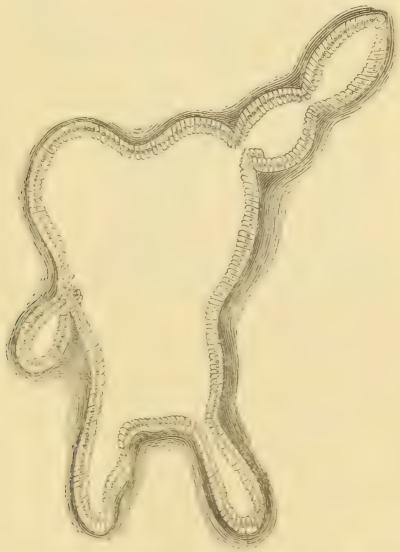
names of 'Alveolar Disease of the Ovary,' or 'Cysto-Sarcoma of the Ovary.' This condition has been described by Rokitansky as occurring in one case which came under his observation; he has termed it a 'Cysto-Sarcoma Adenoides Uterinum Ovarii.' Zeitsch. der Gesell. der Aertzte zu Wien. 1860.

For the more minute description of these changes I must refer the reader to Dr. Fox's paper. In three out of the fifteen

cases he has examined, where multilocular cysts existed, and in which he could not find the glands last described, Dr. Fox met with a process of secondary cyst formation of a somewhat different character. The cysts in these cases gave off diverticula, which proceeded both from the thin-walled varieties, and from those situated in the denser portions of the stroma. In the former case the diverticula (which resembled those in which many glandular structures originate in the embryo from the gastro-pulmonary canal) expanded at once into cysts which projected into the interior of similar adjacent formations; while in the latter, long tubular follicles were given off, portions of which became, by a series of successive constrictions, converted into cysts.

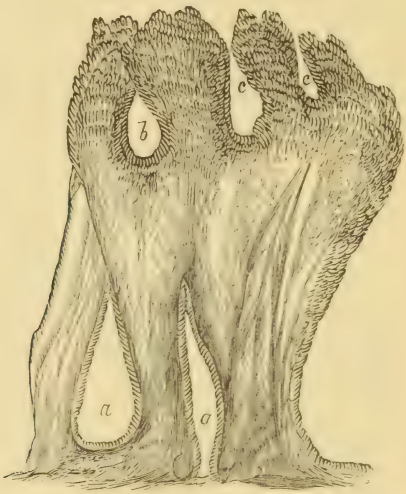


Three Diverticular, or Secondary Cysts, projecting through the outer wall of a Thin-Walled Cyst, from a Multilocular Ovarian Tumour. (× 90 Diam. reduced.)



Formation of Secondary Cysts, by Tubular Processes given off from Cysts in thicker portions of Stroma. (× 250 Diam. reduced.)

The third class of cases investigated by Dr. Fox were those where cysts are found associated with cauliflower growths springing from the interior of the parent cysts. This class, to which the theory of the origin of cysts from single cells has been chiefly applied by Rokitansky, has received a different explanation from Dr. Fox. He describes these growths as solid masses, consisting of a very vascular prolongation of the stroma of the ovary covered by epithelium, and from the surfaces of which may spring an indefinite number of similar growths. In these luxuriant growths spaces covered by epithelium become enclosed, and, inasmuch as the epithelium forms a secreting surface, these shut spaces become dilated to cysts. Numerous instances of this process are given in Dr. Fox's paper.



Vertical Section through a Cauliflower Mass, showing the mode of formation of Cysts; irregular spaces lined by Epithelium enclosed by Papillary Growths. (× 250 Diam. reduced.)

aa. Spaces at base of growth.
b. Space at apex, entirely enclosed.
cc. Spaces partly enclosed.

Dr. Fox has appended to his paper some analysis of the fluids contained in these cysts, from which, in conjunction with those of Dr. Owen Rees and Scherer, he concludes that their contents are not due to any degeneration of the stroma of the ovary, but that their varying reactions are owing to the

conditions of pressure under which the fluids are secreted from the lining membrane of the cysts.

Having thus, in all the so-called 'colloid cysts,' examined by him, traced the formation of secondary cysts to newly-formed structures of a glandular type (Dr. Fox believes that those found in conjunction with the cauliflower growths must be placed in the same category, 'as they can only be regarded, similarly to the Haversian fringes of synovial membranes, as everted glandular structures'), he calls attention to the observations of Pflüger and Billroth on the origin of the Graafian follicles from tubular processes in the early embryonic conditions of the ovary, an opinion which his own observation leads him to confirm, and he expresses his belief that the origin of all the varieties of these cystoid tumours must be traced to 'a renewal in the adult of the early mode of development of the Graafian vesicle, with various morbid aberrations from the type of embryonic growth, a morbid condition of which we already possess instances in the mamma, the testicle, and the thyroid gland.'

Dr. Fox believes, though he has not had any opportunities of examining multilocular cysts containing dermic structures, 'that these will be found to follow the same law,' 'inasmuch as they have been shown to contain both normal hair follicles, sebaceous and sudoriparous glands, all of which structures are the frequent seat of cyst formation.'

Fibrous tumour.—A true fibrous tumour of the ovary is a thing of very rare occurrence, so rare indeed that until the present year not one, distinctly characterised and taking its origin in the ovarian tissues, ever came under my observation. And it will be found that cases reported as ovarian fibroids are in reality tumours beginning in the uterus, which overgrow and involve the ovary so as to disguise its natural appearance or conceal it altogether. Kiwisch maintains that he has found round solid fibroids of considerable extent in two cases; in the one the size of a child's head, in the other about as large as a small adult head. Such tumours have, he says, in general, very little tendency to undergo dangerous metamorphosis, though in the Surgical Clinique at Prague he lost a patient by what he calls 'partial decomposition of an ovarian fibroid.'

Speaking from personal observation, there seems reason to doubt the correctness of the diagnosis in these reports. Indeed, more than a hundred cases are on record where the abdomen has been opened with the object of removing an ovarian tumour, but the operator discovered, after making the incision, that the tumour was not ovarian, but uterine. And further, some of the tumours actually removed, and believed by the operator to be ovarian, have been proved on careful examination to be really fibroid outgrowths from the uterus, more or less pedunculate. In one case of a pedunculate fibro-cellular outgrowth from the fundus uteri, I only discovered what I had done by finding both ovaries healthy, and when this tumour was exhibited at one of our Societies I had difficulty in convincing some of the Fellows that it was not ovarian.

Last year a specimen shown at the Obstetrical Society of London, illustrating an operation for double ovariotomy, was reported on by Dr. Meadows and Mr. Scott as being composed of hard dense fibrous tissue, but having in some places a kind of reticulated appearance. Under the microscope it was found to consist of white fibrous tissue, some elongated fibre cells, and a few rounded granular cells and granules. The reporters added that it seems possible that the tumour originated in the fibrous stroma of the ovary, and that its growth in one direction did not interfere with that portion of the ovary which still maintained its normal character, and, so far as could be judged, performed its ordinary function. Dr. Wilson Fox also reported on the same tumour, and states it to be a 'loculated fibroid; but in the more central and transparent parts of the loculi there are a great number of non-striated muscular fibres. It is very difficult to isolate non-striated muscle after a preparation has been in spirit, but there are a number of broad-banded fibres not affected by acetic acid (as the surrounding bundles of fibrous tissue are) and containing long fusiform nuclei.' The remains of the ovary appeared to me to be separable from the tumour; and, while not denying the *possibility* of a tumour largely made up of non-striated muscular fibre originating in the ovary, I think it must be excessively rare, as I have only seen two such tumours; whereas such tumours

originating from the uterus are among the most common of morbid growths. In the spring of this year, however, I removed two tumours which were really fibrous tumours of one ovary, the right in both cases. One weighed nine ounces, the other four pounds and a half. In both cases there was a large quantity of fluid in the peritoneal cavity. One patient was in the third month of pregnancy, the other a single lady. Both recovered. One of these tumours is now in the Museum of the College of Surgeons.

In most of the tumours hitherto mentioned, the cystic cavities have been the most noticeable features. But it sometimes happens that, though a number of cysts exist together, the cavities are in a measure obliterated and their presence obscured by the hyperplastic condition of their walls. These overgrown partitions are made up of a fibrous vascular mass not in any way to be distinguished from that usually seen in cyst walls. Its excessive quantity is its only peculiarity, and by its encroachments on all sides the area of the cysts and the amount of their contents are proportionally diminished. Some authors have given to this form of the disease the name of cystosarcoma. The solidity or softness of these tumours will of course depend on the relative growth of the walls, or the expansion of the cysts. It is not at all uncommon to find them in connection with large cysts developing perhaps in some part of the walls, or more commonly towards the base. In some cases, the whole ovary, having given rise to one or more large cysts, increases after this fashion. They grow very rapidly, and have a strong hæmorrhagic disposition, causing also in some cases effusion of blood into the cyst cavity.

In Case No. 111, the fluid of the first tapping was transparent and straw-coloured; of the second thicker, of a light port wine tint; of the third, six or seven weeks later, after a good deal of emaciation, of a dark brownish-red colour, containing a large quantity of blood. During the operation several large masses of clot and fibrin were turned out of the cyst. Dr. Ritchie reported of the cyst that the thickness of the walls was increased at intervals, the increase being most marked at one point where the sensation given to the finger was that

of the presence of a fibrous tumour in the walls of the cyst. This tumour was eight inches long, six inches broad, and from one and a-half to two and a-half inches deep. It consisted of ovarian tissue, many of the meshes being filled with lardaceous deposit, some loculi undergoing fatty degeneration, and others becoming purulent. In the loculi nearest the large sac the internal wall had given way, and the contained clot projected like a fungoid mass, which was easily broken down with the finger, and resolved itself into shreds and granules. The lining membrane of this part of the large cyst had a mucoid appearance, and was excessively vascular. Large veins ran in every direction, and several of the largest of them were more or less corroded. Some of the corrosions did not extend through all the coats of the vessels, and these appeared under a magnifier as small ulcers with ragged edges. Where the ulcer had eaten through and through the vessel, blood had been effused and a clot formed. The accompanying engraving represents some of the vessels.

In another case (No. 96), Dr. Ritchie found the cyst walls in some places two inches thick. In this part ‘ were developed between the two internal layers and intimately connected with them both, a mass of cysts varying from the size of a pear to that of a pea, the larger ones being compressed laterally, the smaller ones retaining the spherical form. The extremities of the ellipses formed by the larger among these bladder-like

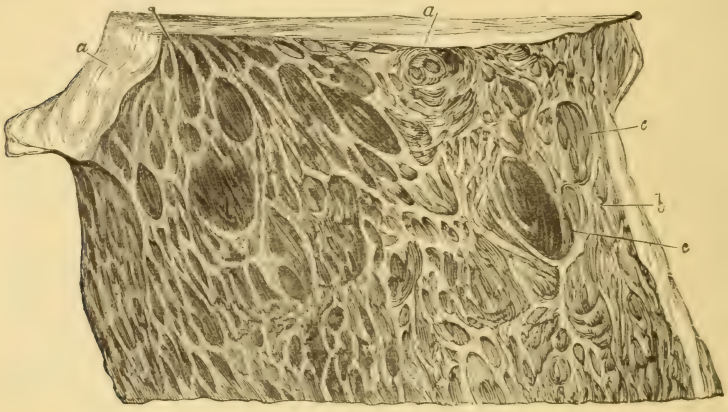
vesicles projected into the principal cavity, whose walls formed crescentic margins around them.'

The solid matter of the tumour removed in Case No. 97 consisted of honey-combed masses, whose cells contained a thick, white, semi-solid substance, of the consistence of tallow. The greater part of the tumour reported on by Dr. Ritchie in Case No. 99 was made up of a resistant mass of about the size and shape of an ordinary placenta. 'On making a section through this it was found to be invested on every side by a firm fibrous capsule, about two lines in thickness. This capsule sent projections into the interior of the tumour, and these projections met and crossed each other at different angles, so as to form a network. From the interstices of the network projected a number of thin-walled translucent vesicles, containing a colourless fluid. The largest of them did not exceed the size of a small plum, while the smallest were mere specks. Most of the larger ones had been forced into an elongated oval shape, and as they projected from the fibrous network, the latter formed a sort of collar which embraced them. Some of the vesicles were very vascular, receiving little trunks of vessels, which ran along the fibrous bands. The vesicles could be enucleated entire. They appeared to be formed by a basement membrane, epitheliated internally, and covered externally with shreds of fibrous tissue.'

The meshes of the tumour removed in Case No. 104 varied very much in size. The great majority of them appeared to be about the size of a pin's head, and separated from each other by partitions about one quarter of a line thick; some of them, however, were three-eighths of an inch broad, and one inch or more long. The walls of these were considerably (perhaps four times) thicker than the others; they could be dissected free, and were found to be continuous with and to branch from the tunica albuginea. One thing is worthy of notice—the larger cysts were not spherical, but elliptical.

The tumour in Case No. 113 weighed from fifteen to twenty pounds; its texture was soft and friable, so that in handling, it tore by its own weight. On what had originally been its inferior and posterior aspects it was much broken up, but it was impossible to say how much of this was due to the operation itself, how much had been antecedent to it. The

external surface of the tumour was in some parts marked by traces of adhesions. The structure of the tumour was tolerably simple, and is well shown by the accompanying engraving, which is a section perpendicular to the surface, and reduced to a quarter of the actual size.



The investing membrane, the tunica albuginea (*a*), is seen partially in profile; continuous with it the fibrous trabeculæ (*b*) enclose small spaces (*c*); these spaces were filled originally with mucoid fluid.

Cancer.—The ovaries, like all other parts of the human body, become the seat of cancerous disease. It assumes no special forms in them. Every kind of cancer infesting other organs is in turn reproduced in the ovary. The peculiarity of its tissues and the arrangements of its component parts perhaps in some respects facilitate the development of the disease. The fibrous stroma, the dense investment, the abundant groups of innocent reproductive vesicles, and the ever-growing intra-follicular epithelium, seem respectively typically to prefigure the forms of scirrhous, colloid, papillary, and medullary cancer.

Paget says (p. 613, edition by Turner):—'The most remarkable examples of hard cancers with fibrous structures, that I have yet seen, have been in the ovaries of certain patients with common hard cancer of the breast or stomach. In these cases the place of the ovary on either or on both sides is occupied by a nodulated mass of uniformly hard, heavy, white, and fibrous tissue. The mass appears to be, generally,

of oval form, and may be three or more inches in diameter. Its toughness exceeds that of even the firmest fibrous tumours, and its component fibres, though too slender to be measured, are peculiarly hard, compact, closely and irregularly woven. They are not undulating, but when they can be separated, singly or in bundles, they appear dark-edged, short, and irregularly netted. With these I have found only few and imperfect cancer-cells; with more numerous nuclei, elongated and slender. They are not mingled with elastic or other "yellow element" fibres.'

This is mostly a disease of advanced life, and may precede the other forms of cancer, or degenerate into them. Richeteau, in 1867, records the case of a woman, twenty-four years of age, who died in the Charité with both ovaries diseased, one being a whitish mass, the size of a fœtal head, of considerable consistence, oval and irregular on the surface; the left ovary smaller, but the same in appearance. Microscopical examination showed them to be cancerous.

The tendency of the cystic form of tumours to degenerate into that known as colloid cancer is very apparent. But the colloid characteristics may be present from the very commencement of the disease and occupy the whole organ; while in some cases all the conditions coexist, and in the same tumour are found cysts with an almost pure fluid, other spaces with the jelly-like contents, and some again exclusively filled with the dendritic epithelial growths passing into the soft state of medullary cancer. The colloid cancer is a sort of intermediate form of disease, having intimate alliances and resemblances on the one hand with the innocent single cysts, and on the other often being intermingled and confused with the most rapidly spreading and malignant cancer growths. It grows quickly and largely, but not having a tendency to destroy life by reason of any special poisonous virulence contaminating the whole system, it is seldom that there is an opportunity of examining the primary stages of its formation, except when tumours have been removed by operation. They consist of a mass of countless alveoli, often involving the entire ovarian structure, and acquiring a bulk equal to that of any of the cystic tumours, and filling up the pelvis and abdomen. These cells, or alveolar spaces, are of all sizes, ranging upwards from that invisible to the naked eye. In

some parts the appearance is that of fine sponge, and in others the alveoli expand into the round or oval form of cysts. Generally some of these larger cysts grow and predominate over the others, and form protuberances, or projections on the surface of the mass. Many of the spaces communicate with each other, though there are generally indications that they were all originally separate. The partitions of the alveoli are made up of white, shining, and firm though delicate fibrous tissue ; and, in the case of dividing large spaces, have considerable thickness and are not sparingly vascular. The smaller cavities are often only limited by membrane of extreme tenuity, and it does also happen that occasionally even the larger accumulations of semi-fluid matter are only held together by the finest films of tissue. The contents are a tenacious, viscid matter. Its consistency varies from set-jelly solidity to a ropy, glairy stuff, which may be drawn out into strings. It is seldom clear and colourless ; often brown or yellowish, or even a pale green, having mixed with it flocculent, whitish, creamy substance, and many epithelial cells, oil drops, and granular matter.

The tumour removed, Case No. 3, Nov. 5, 1858, from a married woman, aged thirty-three, was thus described at the time in the simplest language, without any theoretical bias as to its pathological classification. Some two or three pints of its contents having been previously emptied, it weighed on removal twenty-one pounds. The external capsule was firm, fibrous, and very vascular ; section showed an immense number of imperfect cysts, or alveolar cavities, from the size of a pea to that of a small apple ; and one large cyst, which had contained from two to three pints of viscid fluid. The walls of the cyst and alveoli were very vascular, inclosing a semi-opaque, jelly-like substance, varying in colour from white to dark chocolate in different places, and in consistence from that of firm jelly to that of white of egg. By a little pressure this matter was made to exude easily from the divided cavities. Thus the tumour might be described as a fibrous network, forming irregular cavities containing gelatinous matter. After maceration and squeezing out the contents, the septa were seen to form very imperfect separations between the cavities. A great quantity of molecular matter was seen, with free nuclei, and small oval cells about the diameter of blood corpuscles ; also

numerous large granular corpuscles, from two to three times the diameter of blood corpuscles, and an abundance of oil globules. When exhibiting this specimen at the Pathological Society, I said: 'It is a question, however, whether the distinction between the compound ovarian cyst and true colloid disease is as well made out by any observation of minute structural difference as in the clinical history; especially in the important fact that the former disease shows no tendency either to reproduction in distant parts of the system, or to contaminate neighbouring parts or glands.'

The subsequent history gives some importance to these remarks. The woman made a rapid and uninterrupted recovery, and remained well for some months, doing field work, and having gained, early in 1859, fifteen pounds in weight. But in July she began to suffer from symptoms of chronic peritonitis, followed by those of obstructed intestines, and died on August 26.

Mr. Jardine of Capel, near Dorking, examined the body, and sent me one specimen, which showed a portion of the abdominal wall, containing the cicatrix, the peduncle of the removed ovary adhering to it, and connecting it closely with the uterus; and the left ovary, in which disease had commenced, and gone on to the formation of a compound cyst about the size of a small orange. Another specimen, which I also preserved and laid before the Pathological Society, showed two strictures of the ileum, very near the cæcum, caused by cancerous deposit between the peritoneum and muscular coat of the intestine. A similar deposit, in small nodules, had been strewed over nearly the whole of the peritoneum and its reflections. Mr. Jardine examined the structure of these nodules microscopically, and reported as follows: 'The masses are, when small, only between the peritoneum and muscular coat of the intestines, and have a distinct limiting membrane of their own; nowhere appearing to be infiltrating growths. As they increase, the general tendency seems to be to push out the peritoneum, and to become pedunculated, rather than to spread flatly under it. The bulk is composed of cells about the size of pus corpuscles, with large nuclei (in some cases almost filling up the cells), refracting light more strongly than the cells themselves. Most of the cells approach the globular

form, but many are fusiform and elongated. No nucleoli, but some oil globules in cells, and nuclei, and much free oil; a small amount of fibrous tissue running throughout, but not with definite arrangement.'

Simple cysts may arise in the ovary and do nothing more than enlarge, or their epithelium may degenerate independently and go on to the formation of the worst forms of epithelial cancer. Dendritic growths spring up; and the steps of their formation, so far as they can be seen, are as follows. An epithelial cell elongates and projects into the cyst cavity—that is to say, a scale of tesselated epithelium becomes columnar. The columnar epithelium becomes stratified by the continued upward growth of cells. Lateral offshoots are sent out, and these offshoots again subdivide into minute ramifications. Shut cavities may

be formed by the accidental cohesion of their branches. Loops of vessels accompanied with fibrous tissue grow upwards from the stroma into the dendritic formation. They increase rapidly, and soon show their affinity to, and tendency to degenerate into the condition of medullary cancer. The accompanying engraving is a magnified representation of the transverse section of the wall of an ovarian cyst.

The wall is entirely composed of fibrous tissue, except at its upper margin, where it is epitheliated, and where the dendritic growths are in active progress.

Simple cysts may also be surrounded with colloid or medullary growths, and from contact or close proximity may be induced to make this secondary addition to the general mass of disease. Or the cystic disease of the ovary may advance in one part after the simplest manner, while in some other part, medullary cancer may make its invasion of the organ in its usual way, either as an infiltration of the tissues, or by taking at first limited action and giving origin to a capsulated tumour, which, after enlarging, softens, yields at one point of its coats, and shoots forth fungous outgrowths.

But sometimes the true cancerous disease attacks the ovary without any preliminary formation of cysts, destroys its structure, speedily runs over the peritoneum, and insinuates itself into the lymphatics, glands, and viscera. The disease is usually one of middle or advanced life, but, in one of the cases reported below, it will be seen that the age of the patient did not exceed fourteen years. Its progress is rapid, and occasions the pouring out of ascitic fluid, and many other complications perplexing the diagnosis. In all the three patients whose history is now given, the question of ovariotomy had been considered, but had been negatived, both by local conditions of the tumours, and by the visible cachexia indicative of malignant disease.

Cancer of both ovaries.—E. A. N., æt. 44, was admitted into the Samaritan Hospital on June 3, 1862. Married for fourteen years, but has never conceived. No hereditary influence can be traced. Three years ago the patient discovered a tumour in the left iliac region; at first it was not painful, but produced incontinence of urine. After some months this latter symptom disappeared, and about a year ago the swelling be-

came so painful, that the patient was obliged to confine herself to bed. Six months later, the catamenia, which had formerly been regular, ceased, and did not return. Four months ago the patient was tapped in St. Bartholomew's Hospital. One hundred and fifty-eight ounces of fluid were removed; but, after the operation, a large solid mass remained behind.

On admission the breathing was hurried and incomplete, the legs slightly œdematous; the girth at the umbilical level was forty-one inches, the distance from the ensiform cartilage to the symphisis seventeen inches. The whole anterior part of the abdomen was dull on percussion. Fluctuation very evident, and on making deep pressure, the fingers impinged on a hard body, whose outline cannot be defined. The patient was tapped by puncture made with a lancet, and fifteen pints of glairy fluid drawn off by means of a syphon. After riddance of the fluid, the tumour was found to stretch from the left groin across the abdomen to the right hypochondrium. It did not appear to be adherent to the integuments. Per vaginam, several hardish immoveable masses were felt behind the uterus. The patient became gradually weaker, and died on July 19.

Ascitic fluid filled the peritoneal cavity. Both ovaries were diseased and increased in size, and contained several cysts. Dr. Aitken, of Netley, examined portions of the ovaries, and reported a number of cysts, some simple, some proliferous, and a mass of malignant growth which had grown to and encroached upon the rectum.

Cancer of left ovary and ascites.—E. T., æt. 59, was admitted into the Samaritan Hospital on December 6, 1863. Twice married, no children, no hereditary disease, never seriously ill (with the exception of an attack of pelvic cellulitis, fifteen years ago), but living in a crowded part of London and badly nourished. She had not menstruated for five years.

Twelve months before, a tumour was found in the hypogastrium. Abdominal enlargement, ascites, and prolapse of the womb quickly followed. She was then relieved by tapping, which, in eight months, was repeated five times; the evacuated fluid was described as being thick and glairy.

On admission, emaciation considerable, expression anxious; the skin cool, and the feet, especially the left one, are cold. The patient states that she frequently perspires on the left side

of the body, never on the right. The left leg is extremely œdematous, and its veins are varicose. She always sleeps on her back, being unable to turn on her side on account of a rolling weight in the abdomen. Pulse 104, thready; sounds of heart normal; urine slightly diminished in quantity, with a copious deposit of urates. Considerable pain before and after micturition. On examination, the abdomen measures at the umbilical level thirty-nine inches in circumference, while the distance from the ensiform cartilage to the pubic symphisis is fifteen and a-half inches. The superficial veins of the abdomen are dilated; the lower ribs pushed outwards, and the liver somewhat displaced in an upward direction. Fluctuation is very distinct, being evidently due to a collection of ascitic fluid. Crepitus is both to be felt and heard on the right side. On making deep pressure, a resistant nodulated tumour is felt, filling the hypogastric and part of the iliac region; its mobility is very limited, its tenderness not very great. Vagina œdematous; os uteri virginal; uterus retroverted.

In December, sixteen pints of a yellowish fluid, not unlike pale ale, of a specific gravity of 1020, were taken away by tapping. It was highly albuminous, and under the microscope it was found to contain red and white blood corpuscles. After tapping, the patient became very faint; but she rallied and lingered on till February 26, 1864, when she died exhausted.

The post-mortem revealed the presence of some ascitic fluid, of cancerous warts on the peritoneum, and of a large multilocular tumour of the left ovary. This tumour was adherent in front to the bladder, behind to the rectum, and on the left to the pelvis itself, as high as the crest of the ilium. The adhesions were too strong to be torn, and the tumour was almost immoveably fixed. The right ovary was also the seat of cystic degeneration. The tumour of the left ovary was carefully examined, and exhibited, in different parts, unmistakable appearances of cancer.

Soft cancer involving the ovaries of a child.—January 19, 1864, saw the patient with Mr. Berry. E. C., a scrofulous child, æt. thirteen years nine months, began to menstruate eight months ago; four months later she had an attack of erysipelas of the face and head, from which she recovered tolerably well. Five or six weeks ago she was troubled with

constant desire to make water, and two weeks later the catamenia came on; since then they have never ceased. Simultaneously with the appearance of the catamenia, a small tumour was observed in the hypogastrium. At first it increased slowly, but within the last three days it has reached its present dimensions. There was a distinct firm tumour filling up the whole of the abdomen below the umbilical level. It was not tender on pressure, and fluctuation was very indistinct; impulse, however, being well marked. The tumour was firmly fixed. The superficial abdominal veins were considerably dilated, and inosculated freely with those of the mammæ. *Per vaginam*, the uterus was found to have been pressed high up, by a tumour behind it and in front of the rectum.

Mr. Berry tapped the patient at a point midway between the umbilicus and anterior superior spinous process of the ilium. Three or four ounces of straw-coloured fluid came away, and were followed by a discharge of pure blood. Only two and a-half ounces of blood were lost, but the little patient became very weak and faint. The fluid consisted of ordinary serum with granular corpuscles.

The tumour increased rapidly, and could be felt midway between the umbilicus and ensiform cartilage; more fluid accumulated, and was removed by tapping *per vaginam*.

The patient died on March 5. At the post-mortem three to four pints of fluid escaped on opening the abdomen. The tumour was firmly fixed in the pelvis, and was glued to the intestines. It was removed along with the uterus and bladder, and sent to Dr. Wilson Fox, who found encephaloid cancer of the bladder and of posterior wall of the uterus. 'The tumour consists of a cystic portion, whose periphery is covered with cancerous nodules, and of a solid portion, from which, by scraping, a milky juice exudes. Microscopically, the closest resemblance is found between the ovarian disease and that of the other cancerous nodules. The general structure in both was that of cells and nuclei imbedded in a stroma of fibres with large nuclei and capillary vessels. The greater portion of the juice scraped from the tumour presented nothing but free molecules and nuclei. They are round, or irregularly oval, and have an average diameter of $\frac{1}{1600}$ to $\frac{1}{2000}$ in. They have granular contents, and a clear nucleolus. In addition to

these, a few larger ovoid ones were seen; also elongated spindle-shaped cells, with elongated nucleus and clear nucleolus, which probably belong to the stroma or to growing vessels. Very few larger cells were seen, and these were chiefly observed in the ovary. It contained numerous nuclei, having an average diameter of $\frac{1}{3500}$, each with a bright, clear nucleolus. The diameter of the cell was $\frac{1}{800}$ in.; its walls were well defined, and its contents darkly nebulous. Cells were also seen occasionally, having a diameter varying from $\frac{1}{1200}$ to $\frac{1}{1500}$ in.; in some cases with a large, single nucleus, in others with a double nucleus. In one part of the field a body was seen which strongly resembled an immature Graafian follicle undergoing degeneration. It had an appearance of fibrillation around the whole of its circumference, certainly more than could be attributed to any thickening or folding of the cell-wall. The whole contents were rather darkly granular, but around the inner margin were indistinct traces of cell-structure, such as is seen in the membrana granulosa of mammalian Graafian follicles. It was circular, or nearly so, and had a diameter of $\frac{1}{500}$ in. In the thicker-walled cyst was contained some milky fluid; in section, the whole of the wall was found occupied with a cancerous growth.

'On section of part of the walls of one of the thinner-walled cysts, a clear, semi-transparent, not viscid fluid exuded. The walls correspond in structure with that of the thinner-walled ovarian cysts seen in multilocular tumours of the ovary. The wall was fibrous, with many spindle-shaped cells interlacing in a series of meshes and mingled with finer areolar tissue. Cancer-cells were only seen in a few places in the wall. The epithelial lining had disappeared in a great measure from the interior. (Post mortem change?) Here and there were a few flattened cells. At the inner boundary a few swollen and granular cells are still adhering; these latter are indistinctly nucleated. At one spot a villous, cancerous growth was seen projecting into the interior of the cyst. These cysts must be regarded as Graafian follicles in which the ovum has perished, and the membrana granulosa also been destroyed. As a consequence, they had become somewhat distended by a serous secretion, and were, at the time of observation, in the course of invasion by the cancerous growth. The relation of the cancer

of the ovary to that of the other tissues must, I think, be regarded as somewhat doubtful.'

Tubercle.—Rokitansky denied altogether the fact of tubercle being found in the ovary. Other pathologists speak of it as rare, and as generally associated with similar disease of the peritoneum and other organs. A large cyst was removed from a single lady, æt. twenty-three, who died five days after the operation from diffuse peritonitis of a low form, probably tubercular. Dr. Wilson Fox carefully examined the specimen, and described the cyst as single, with the exception of a few scattered, thin-walled cysts on the inner surface. On the outer surface, beneath the peritoneal coat, and firmly blended with the surrounding stroma of the cyst-wall, there were numerous nodules about the size of peppercorns, of a cartilaginous hardness, appearing on section glistening and semi-transparent at the circumference, and opaque and cheesy at the centre, which was slightly softened. The nodules themselves were without any trace of vessels, but the tissue around each nodule was very highly injected, and in the injected area there were delicate false membranes studded with the finest granulations of miliary tubercle. False membranes were also seen on other parts of the tumour, containing fine granulations of miliary tubercle; and similar gray granulations, not larger than a pin-point or a poppy-seed, on some parts of the outer wall of the cyst. Under the microscope, the outer part of the larger masses and small gray granulations were observed to have the same structure, and to consist of slightly elongated cells, containing large, round, very clear, highly-refracting nuclei, each nucleus containing a nucleolus. The nuclei were in some parts free. In some parts of the field cells with two nuclei could be found; these were imbedded in a clear, separating, finely-striated, and very firm inter-cellular substance. The cells averaged $\frac{1}{2500}$ in. in diameter, the nuclei $\frac{1}{4500}$. The cheesy yellow matter in the centre of the nodules consisted of oil globules, granular *débris*, and shrivelled cells. From these characters, Dr. Fox had no doubt that the nodules and gray granulations were of tubercular nature.

I have since met with at least eight cases in which there was tuberculous deposit in ovarian tumours.

CHAPTER III.

DERMOID CYSTS.

The accidental new formations in ovarian cysts, though not so common as the fluid contents, occur often enough to make them not only objects of curiosity, but of pathological importance. Among these substances may be mentioned striated muscular fibres, brain and nerve tissue, bone, adipose tissue, and all sorts of dermoid structures—such as hair, teeth, and glands. As a general rule, the growth of cysts with contents of this kind is arrested after a certain time; they remain stationary; and if the abdominal bulk of the patient goes on enlarging, it is owing to the outpouring of ascitic fluid from the irritation to which the cysts give rise. Sometimes inflammation and suppurative action set in, and the contents are discharged by apertures communicating with the natural passages, or through fistulous openings in the abdominal walls.

An interesting case of this kind was read by M. Larrey to the Academy of Sciences of Paris.

'A woman from the environs of Evreux, named Rose B., aged thirty-three years, well formed, married, with three children, observed, a few days after her last confinement in 1836, a somewhat painful tumour in the abdomen, below, and a little to the left of the umbilicus. In two months the tumour had acquired the size of a fist; the urine became turbid, from the admixture of fatty matter. During the next five years the swelling gradually increased, and became circumscribed between the umbilicus and pubes. In January, 1841, it opened on the surface of the abdomen, and discharged at intervals various kinds of pus, afterwards a detritus of calcareous matter, and three weeks subsequently a production, consisting of hairs more or less long, which the patient often removed herself, and which appeared like a long mesh, prominent externally, and adherent to the base of the fis-

tulous opening. At the end of four months urine flowed from the opening, whilst the urethra gave passage to pus, hairs, gravel, and even osseous concretions. At length a stone was formed in the bladder, and added a new complication to this grave affection.

'At this time she was sent to Paris, and came under M. Larrey's care in the clinical hospital of the Faculty. An attentive examination caused him to diagnose a urinary fistula below the umbilicus, caused by inflammation of a hairy cyst of the left ovary, which had opened itself into the interior of the bladder, and on the surface of the abdomen, the different products of which had doubtless formed the nucleus of a calculus. The unfortunate patient suffered so much at times, and had so much disgust for her infirmity, that she announced the firm resolution of submitting to all the chances of surgery in the hope of cure.

'The following operation was decided on. To incise the fistula directly from below, to explore the cyst, and extirpate the fibrous tumour in which the mesh of hairs was implanted; to enlarge the wound with such precautions as not to injure the great vessels on its posterior wall; to penetrate into the bladder, and, after having divided the passage of communication, lastly, to seize the stone, and extract it by the same opening. Such was the operation M. Larrey performed in the presence of several practitioners and students.

'The patient bore the operation with much courage. She completely recovered, notwithstanding an attack of confluent small-pox, which made its appearance fifteen days afterwards.'

The new formation of striated muscular fibres has been observed only by Virchow, who gives the following description. The accumulated stroma in a large ovarian tumour formed prominences in different parts of the cyst walls, and between the cysts a large quantity of dense tissue was found as a fibrillated, whitish mass, in which were imbedded nodules of various sizes—from that of a cherry to that of a large apple—and of a yellowish white colour. There were a few among them which had an almost glandular appearance; they were delicately mottled with yellow, and were firm, but not hard. They nowhere presented a distinctly fibrillated or fascicular arrangement. But, under the microscope, dense layers of striated

muscular fibres were seen, having the same form and general characters as those of the embryo. The single fibres were long, moderately broad, fusiform cells, with a long oval nucleus, and well-marked transverse striation. Virchow suggests for tumours containing such tissue the name of Myosarcoma.

Brain matter, as seen in these cysts, has been described by Gray, Chalice, Friedreichs, and Rokitansky. Gray found a tumour the size of an orange, consisting of five cysts. Three of these contained fat and hair; one of them also bones and one tooth. The fourth cavity was the size of a walnut, had very thin walls resembling the pia mater, forming like that a sort of meshwork, and it inclosed a brain-like mass, in which the elements of the gray substance and nerve-fibres were discernible. The fifth and smallest cyst had similar contents. Chalice discovered a soft, white and grayish substance, resembling brain, in the ovarian cyst of a young girl. And Rokitansky found an independent nervous apparatus, arising from a ganglion, in a cylindrical osseous new formation, covered with true cutis, growing into an ovarian cyst. The mass was also vascular. The reddish ganglionic substance was enveloped in a capsule formed by two layers of the cell wall. A nervous cord issued from the ganglion, and sent ramifications into the osseous body, which were ultimately distributed in the same way as the nerve fibrils of the cutis.

Friedreichs examined an ovarian cyst of the size of an apple, consisting of two cavities. A conical mass of cuticular structure was attached to the uterine end of the larger cavity, and projected into it. This body was covered with hairs, contained adipose tissue, complete and rudimentary sebaceous glands, and distinct nerve fibres, with double dark borders. Numerous recently-formed vessels, and thirty strong cords of broad nervous branches, with double borders, were found in the areolar tissue of the expanded membranous septum. On the opposite surface of the septum, forming part of the smaller cyst, there were thick whitish layers, of very soft consistency, which were made up of innumerable thin, varicose nerve fibres, with well-defined borders, and all having the same direction and parallel arrangement. Between these were interspersed irregularly, thicker nervous elements, with double borders. There were also large unipolar and bipolar pig-

mented ganglionic cells, with large round nuclei. A delicate capillary network pervaded with its large meshes the whole new-formed medullary substances, and was kept together by a fine but perfect investing membrane. The nuclei of the connective tissues in this were partly pigmented, and partly in a state of fatty degeneration. At two points in the white medullary nerve substance, there were seen extremely soft, almost pulpy, grayish, transparent masses, which consisted of nerve cells, with circular nuclei (gray substance). These were also supplied with small capillary vessels. Virchow has seen a similar case.

Lebert gave the name of dermoid cysts to those either newly-formed or pre-existent sacs, on the inner surface of which he found growing new formations of undoubted identity with the structures of the skin; and with them not unfrequently cartilage, bone, and nerve matter. Genuine dermoid cysts occur most commonly in the ovaries, although not exclusively so, as they are sometimes attached to the peritoneum, and may be developed in other parts of the body, or even in man, as recorded by Ruysch in the Advers. Anatom. Dec. iii. T. ii. Of one hundred and eighty-eight instances of dermoid cysts which Lebert reports, one hundred and twenty-nine were in the ovaries.

The ovarian dermoid cysts may be either single or multiple, and several of the cysts in a multiple tumour may contain similar structures. The cyst walls are mostly thick; the inner surface may be uniformly smooth, but more often is made uneven by being scattered over with circumscribed elevations, some of which may even rise into conical bosses. The lining membrane is composed of thick layers of pavement epithelium. The uppermost strata of cells are scaly and without nuclei, those beneath show the nuclei, and the deepest-seated are round cells newly formed; the same arrangement as in the epidermis. This cuticular layer is often more than two millimetres thick, and rests on a bed of areolar tissue like the cutis, which is furnished with papillæ of the usual forms. Although these papillæ are as closely packed together as on the palm of the hand and fingers, they are not arranged in parallel rows or regular groups, and are different in size and length. Next to the papillary layer comes a mass of

looser areolar and adipose tissue. In this sort of mock skin the usual tegumentary appendages are often developed in considerable quantities. Abundant tufts of hair are thrown out, sometimes several inches in length, more commonly fair or of reddish colour than brown or black. The hairs grow from distinct follicles, with which sebaceous glands are connected. Other sebaceous glands open directly on the surface of the cyst. Kohlrausch and Heschl, and others, have also remarked sudoriparous glands with very much their natural form and disposition. Wedl mentions, in respect to the hair, that notwithstanding its considerable length, it more resembles in general structure the short hair of the body than that of the scalp. The follicles do not lie so deep, and the bulbs are more conical and elongated. The bone developed in these cysts shows itself first as minute laminæ in the areolar tissue beneath the skin formation. These, as they grow larger, get into most extraordinary irregular shapes, with branches and spicules, or into lumps, composed more of dense compact substance than of porous spongy tissue. The pieces sometimes have a distant resemblance to some parts of the skull, and this is more striking when teeth, as they very often do, grow in regularly-formed alveoli, such as are seen naturally in the jaws. The osseous structure itself is that of genuine bone, the Haversian canals and bone cells being arranged in lamellæ, though the cells are often large, and have fewer intercommunicating branches. In some instances, pieces of bone are held together by a sort of spurious articulation, formed by the periosteum and some dense fibrous tissue. Such a case is recorded by Heschl. The teeth develope either in the osseous substance or in the cyst stroma. They sometimes project into the cyst, or may be completely buried in the areolar tissue. Some are perfect, and have all the structural arrangement of ordinary teeth, but the greater part remain in a rudimentary condition. According to Meckel, they observe the same natural order of succession, and a deciduous tooth will be seen atrophied from root to crown by the pressure of a permanent tooth growing under it. So it was in one of the tumours removed by me in operation (Case 329). But a great many of the teeth are badly formed, and have certain parts deficient or in excess,

The number in a single cyst is sometimes extraordinary. Schabel describes the case of a girl, aged thirteen, not having menstruated, and in whom there was an ovarian cyst, three times the size of a man's head, containing three pieces of bone and more than a hundred teeth of all classes, but mostly incomplete, without proper roots. Paget mentions a cyst in which more than three hundred teeth were found.

Besides the adipose tissue forming part of the organised mass in these tumours, the sacs often contain a large quantity of greasy substance, mixed up with tufts and balls of matted hair. This consists of free fat, exfoliated epithelium, with sometimes so much cholesterine that the crystals give the whole a glittering appearance. With a surface of skin and sebaceous glands, there is no difficulty in accounting for the presence of these concretions. Rokitansky found this fatty compound in one case rolled into a number of round balls. The cyst, the size of a large head, had contracted adhesions below with the ovarian ligament, and above with the anterior layer of the middle portion of the mesentery of the jejunum. Thus balanced, the cyst was twice rotated on its axis from left to right. It contained a quantity of brownish, viscid fluid, numerous balls of matted hair, as large as a walnut, seventy-two balls the same size, made up of fat in concentric layers, and a great number of smaller globules, not bigger than peas. Fatal constriction of the intestines had been the result of the rotations of the tumour, and Rokitansky accounts for the peculiar condition of the contents by the churning motion. Dr. Routh found the fat and hair in a cyst which he removed from an old woman in much the same state. The balls had concentric layers of amorphous fat round a nucleus of cholesterine crystal.

The question whether these dermoid cysts are the result of impregnation (direct or secondary) does not need discussion. They have a character quite distinct from that of extra-uterine fœtations, and grow, independently of spermatic contact, in young children, and even before birth, and in situations and under conditions where such influence would be simply impossible. The peculiar formative and reproductive power inherent in the tissues of the body is as operative in the production of these vagaries as it is in the

crops of multiform morbid growths which spring up everywhere under circumstances of which we can give no rational explanation.

The following is a summary account of the cases of this kind, which have occurred in my practice, where the tumours were removed by operation. The first and second came together, and were published in 1865. In both cases the hair grew, as shown in the annexed cut, from the inner wall of the cysts, and hung into the cavity, where it was matted together with masses of epithelial cells, which had undergone fatty degeneration. The hairs had distinct bulbs, and grew from follicles. Many of them were shed—indeed only a small proportion of them retained their connection with the cyst wall. In one case there were forty-six pints of fluid collected, and the cysts weighed four pounds. Several teeth grew from the lining membrane of two of them. Both patients recovered. All the other cases have come under my notice since the year 1869.

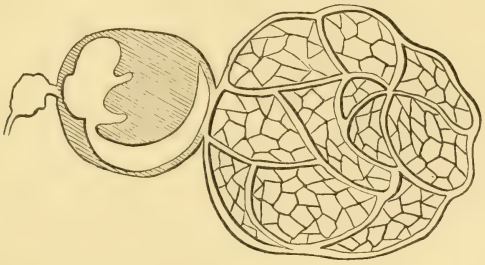
Case 329 was that of a married woman, Irish, aged 27, and mother of four children. She began to enlarge after her first confinement, and the three last children were still-born. General health not much reduced, tumour not very large, but of such excessive hardness that it led to some doubt whether it might not be a fibro-cystic uterine growth, though the length of uterus was only three inches. During the operation, which was performed on June 30, 1869, one of the cysts ruptured, and a quantity of hair, fatty matter, and thick fluid was taken out before any of the numerous adhesions were divided. The ovary of the opposite side was healthy, and the patient recovered, returning to Ireland twenty-six days after the operation. Another child was born in March, 1870. The tumour was globular, with an uneven surface; a compound dermoid cyst of the left ovary, considerably exceeding in size a man's head. A coarse, tough, vascular fibrous stroma formed the walls and septa, of great but unequal thickness, of many cystic chambers of different sizes and shapes. These had a lining,

with all the characters of skin, lying on a mass of adipose tissue. There were numerous sebaceous glands and hair follicles, from which grew thin, fair, straight hairs, about an inch and a-half long, with regular bulbs. Similar hair detached and matted together into balls the size of a chestnut, and when pressed together, flattened and moulded by the irregularities of the walls, with eighteen pints of an opaque, grumous, dirty yellowish-white emulsion of fat, epithelium, cholesterine and margarine crystals, formed the contents of the chambers. Numerous bones were imbedded in the stroma, and made projections into the cysts. One of these was remarkable for its size and shape, being as large as, and very much like, the temporal bone of a fully-grown skull with its long and thick processes. Several large teeth grew in alveolar processes of this bone, and were sticking out into the cavity of the cyst through the skin. In other parts of the walls were many more pieces of bone, some flat, others resembling portions of jaw with teeth growing in them, and frequently with two sets, one pushing up under the other, and causing absorption of the fangs. Every kind of tooth had its representative; some, with only the crown remaining, were loose in the cysts, or entangled in the balls of hair and fat. The bone and teeth had the natural structure. After removal of all the fluids, the tumour weighed five pounds nine ounces.

Case 345.—A single lady aged thirty-nine, with a hard nodular tumour, which could be felt to the left and in front of the uterus, by the vagina. The adhesions were so firm and general, that during the operation it seemed doubtful whether they could be broken through. But they slowly gave way before the fingers, and a long pedicle from the left side was secured partly by the clamp, partly by ligature. The right ovary was healthy. The hardness of the tumour prevented the clearing out of the contents during the operation, which took place early in January, 1870. Recovery was so far advanced as to admit of travelling a journey home by the middle of February. In the month of October following the lady married, and within a twelvemonth, that is on October 6, 1871, she was delivered of a living child. The expulsive action during labour was but feeble, and forceps were used. Convalescence after delivery was retarded by the formation of an abscess in the

abdominal wall, near the upper end of the scar left after the incision in ovariotomy.

The tumour consisted of three distinct portions as shown in the diagram; the ovary, the dermoid cyst, and a large cyst with fluid.



The left ovary was about one-fourth larger than its natural size, with its surface rendered uneven by enlarged Graafian follicles, one of which, about as big as an ordinary pea, contained coagulated blood. There were also the white stellate remains of follicles formerly ruptured. Connected with the outer end of the upper border of the ovary by a short and thin constriction or neck, was a unilocular cyst the size of an orange. The greater part of its hard, fibrous, almost cartilaginous walls was ossified as indicated by the shading in the diagram. The bony portion was a flat expansion nearly encircling the cavity; and from the inner side of it there was a thick solid mass of bone projecting, which had very much the shape of the lower jaw of a rodent (less the coronoid process), and set with badly-shaped teeth. Several depressions in the bone contained little pellets, as large as linseed and peas, of coiled up hair. This hair had no bulbs. The cavity contained a semi-transparent, yellow colloid substance, rich in crystals of cholesterine. A thick, short, solid pedicle connected this dermoid cyst with another thin-walled multilocular cyst, the size and shape of a cocoa nut, filled with thick mucin-colloid. The whole tumour was covered with smooth and clear peritoneum. The fluid from both sacs measured twelve and a-half pints, and the solid walls including the bones weighed twelve ounces.

Case 357.—A married woman, thirty-seven years of age, still regular, having had six children, the eldest twenty-one and the youngest four and a-half years old, and three abortions, the last

eighteen months before admission; with no constitutional disease; her health not much impaired, though she had worked hard; was admitted into the Samaritan Hospital with abdominal tumour, not felt in the pelvis. It began with pain in the left groin nine months before, and she rapidly increased in size, though the tumour only became noticeable within the last three months. The operation for removal gave no difficulties; the tumour was opened, and the greater part of the contents turned out, as there was no fluid to be drawn off by tapping. The cyst was quite free, and the right ovary proved to be healthy. Twenty-six days after the operation she went to Eastbourne.

The tumour was larger than a man's head, multilocular, with tolerably thick walls; most of the cells were filled with a yellowish colloid matter, thirteen and a-half pounds of which were taken out during the operation. An oval mass of matted hair was found in one of the cysts. The hair was brown, with small bulbs; it was of unusual length, some measuring as much as fourteen inches. A group of teeth was growing in the walls of this sac; two incisors and a molar, each in its bag, with all the peculiarities of milk teeth. The molar tooth was especially well-formed. There was neither fat nor degenerated epithelium nor crystals in the colloid matter. The tumour and its contents, in addition to the thirteen pounds accounted for during the operation, weighed sixteen pounds.

Case 362 was a labourer's wife who was admitted to the Samaritan Hospital in April, 1870. Twenty-two years of age, she had been married six months. She was pale, thin, and delicate looking, without any hereditary taint. Noticed pain and some swelling in the right iliac region four years ago; but the increase was very slow until after her marriage, since which the pains have been worse, and always aggravated during menstruation. Present size, thirty-one inches round, at the level of umbilicus; tumour solid and tender; uterus moveable. During the operation a quantity of hair and fat was taken out of one of the cysts. The pedicle was so short, that it was tied with silk and replaced in the abdomen. There were no hindrances during convalescence, and she went to Eastbourne on the 28th day after the operation. Left ovary healthy.

The tumour was a multilocular cyst of the right ovary, with thick, fibrous walls and septa. In the anterior and inferior

segment of the main wall of the tumour there was a large piece of bone flattened, and with processes giving it a likeness to the temporal bone. Several milk molar teeth grew from the concave side of this bone. In other parts of the stroma were more pieces of bone, most of them with teeth of the temporary type. Odd teeth of a similar kind were scattered about in the walls of the cysts, each having its particular follicle. The cysts containing the bones and teeth, and those close to them, were lined with a sort of cutis, having numerous sebaceous glands, and covered with short, perfect, light brown hair. Those not connected with the dermoid portion had only epithelium, in many places a little changed by incipient fatty metamorphosis. The fluid in the cysts amounted to four pints, and in the dermoid cysts was semi-transparent, ropy, and mixed with crystals of cholesterine; in the other cysts it was a sort of colloid. The solid portion of the tumour weighed two pounds eight and a half ounces.

Case 380, July, 1870.—A girl eighteen years of age, who had been menstruating only six months, of healthy parentage, and one of twins, four years ago noticed a lump in the left side, which has been gradually increasing ever since. There is now a tumour filling up the abdomen, with a hard bony mass near the umbilicus; the uterus free, anteflexed; something hard in front of the cervix.—Operation, August 1. A free cyst exposed and tapped, but no fluid escaping, it was held forwards and opened, hair and fatty matter coming out; the inner cysts were broken up and drawn out, after separating a large piece of adhering omentum. Uterus and left ovary scarcely developed. Recovery complete; travelled to Hastings thirty days after the operation.

The greater part of the tumour was made up of one large cyst with thick walls, containing many other cysts within, growing from the inner surface; some sessile, others pedunculate. The base of the tumour was more solid, but areolated. Many parts of the walls of the cysts were cartilaginous, with centres of ossification; this was more advanced in the upper and anterior part. The tumour contained five large pieces of solid bone; three flattened pieces, one with a tooth, in the anterior wall. Two other bones, of very irregular shape, and having sharp processes, were situated in the centre of the more

solid basis, and with them about ten teeth. The interior of the larger cysts was like skin, and the contents were an emulsion of fat and mucin, with balls of hair scantily mixed in. The other cysts had all the usual colloid characters. The external surface of the tumour was extremely irregular, some of the protuberances communicating with the large cyst by short hollow pedicles. Thin membranous expansions from the fringes of the Fallopian tubes spread over these parts. The tumour weighed nine pounds two ounces, and there were seven pints of mixed fluid.

Case 419.—In this case the tumour had been growing for eighteen years. The patient married during that time, and had three children. It was noticed that during each pregnancy the tumour lessened much in size. For the last two years it increased rapidly, so that its removal by operation became necessary, notwithstanding that pregnancy had advanced two months. The presence in the walls of hard bone-like masses had led to the diagnosis of dermoid tumour. In the cavity there was a mass of hair and fat like an enormous chignon. This became quite solid on cooling. The cyst walls were like skin, and had bony plates in them. There was no pedicle, the whole blood supply having been kept up through the vessels of adhering omentum and mesentery. The left ovary was three times its natural size, with large vesicles and opaque spots on their coats. It was left *in situ*. She was delivered of a living child in December, 1871. Her mother died of an abdominal tumour and ascites.

Case 459 was that of a girl operated on in the Samaritan Hospital in January, 1872. She was very fair, and barely seventeen years of age. The abdomen had been enlarged for more than three years. These facts, with the hardness of some parts of the tumour, suggested the diagnosis of dermoid cyst. At the operation there was found a long pedicle, two or three times twisted on itself. The solid portion of the tumour weighed four pounds, and there were twelve pints of fluid. Several plates and spiculæ of bone were included among the harder tissues. The girl recovered perfectly.

In another woman, thirty-seven years of age, who entered the Hospital in 1870, too late for ovariotomy, the post mortem examination revealed a dermoid cyst. The tumour had been

gradually forming for twelve years, and latterly the symptoms had become distressing. Four tappings had brought away some six or eight pints, at each operation, of turbid, dirty yellow fluid with small lumps of fat. Both ovaries were found to be diseased. The right was an enormous tumour, irregular in shape, partly dermoid, partly colloid. The upper half presented the usual appearances of a multilocular colloid growth with a coarse vascular stroma, partly affected with fatty degeneration; and it contained yellow colloid matter. The basal half of the tumour was dermoid. Several large masses of bone were imbedded in the walls, throwing out processes and expansions in the direction of the septa. Besides these there were many smaller bones, some of the shape and size of the alveolar parts of the jaw, with teeth in them. In some places the walls were cartilaginous, and had teeth implanted in them. The cysts were lined with a hairy cuticle, and contained, with the fatty emulsion, balls of hair and fat. Some few scraps of this fat had escaped into the abdomen through the puncture made at the last tapping. The peritoneal covering was thickened, and very closely adherent. The left ovary, the size of a goose's egg, was a series of thin-walled, transparent cysts, having in them a reddish ropy fluid.

The bones and teeth of most of these tumours have been beautifully prepared for me by Dr. Junker by a process of his own devising. After removing most of the surrounding soft structures, he scalds the harder parts with boiling water to which a few drops of hydrochloric acid have been added. The bones are left in this solution about ten minutes, then washed and boiled in plain water until all the soft matter is loosened. This is cleared away by a stream of water. The bare bones are then boiled a short time in a strong solution of soda, washed with soap and water, and when perfectly clean, dehydrated in boiling alcohol.

These specimens may be seen in the Museum of the College of Surgeons.

CHAPTER IV.

INFLAMMATION, DEGENERATION, AND ROTATION OF OVARIAN TUMOURS; PHYSIOGNOMY OF PATIENTS WITH OVARIAN DISEASE.

The ovarian cysts, and more especially the complicated kinds, are liable to become inflamed, either spontaneously or as the consequence of some accident or operation, such as tapping. The disease may run on rapidly, with intense symptoms and general peritonitis, to a fatal termination. Or it may be more localised and lead to suppuration in the cavities. This may go on for some time, with the production of pus as in a common abscess, or the contents of the cysts may be converted into any of the foul disgusting fluids, the result of decomposition. The fatal termination, if the cyst be not removed, may be due to diffuse peritonitis, but more commonly to septic or pyæmic fever, the result of blood changes set up by absorption, or by admixture more or less direct through the vessels of the cyst of the putrid fluids or gases with the blood. In other cases ulcerative action in the walls takes place: they thin, give way, and are perforated. The point of perforation may be free, and allow the escape of the contents into the abdominal cavity, followed either by speedy death or by chronic peritonitis. But if adhesions have glued the cyst to the abdominal walls, they too may be subject to the same destructive action, and a fistulous opening will be formed through them. At other times the adhesions have been between the cysts and some of the viscera. The uterus, vagina, bladder, and rectum are sometimes the route by which discharge takes place; and in a few rare cases it has happened through the attached Fallopian tubes. When perforation has taken place into the bladder or rectum, sinuous fistulous channels are formed, and suppuration may continue for some time, with free discharge of the pus by the natural outlets. But the end of this, if not, as in some rare cases, a spontaneous cure, is either death by pyæmia, or equally fatal exhaustion.

In some instances where the cyst walls have contained bones, their sharp points and angles have caused the giving way of the tissues; and sometimes the other accidental formations of dermoid cysts have found their way into other cavities, generally into the bladder. Diffenbach had to perform cystotomy for the removal of a piece of bone which thus passed from an ovarian cyst into the bladder. Perforation may also take place, in another way, as a consequence of the slower degenerative processes going on in the walls of the cysts. The contents accumulate inordinately; the vessels are pressed upon and constricted or obliterated; the blood supply is diminished; thinning of the wall stroma takes place, and the changes of involution set in. Spontaneous rupture, as it is called, occurs; and when the fluid simply rushes into the abdomen, death is the usual consequence of the induced peritonitis. Yet cases of cure have been met with by many surgeons. Oppolzer, Kiwisch, Ulrich, and others have recorded instances of such recovery.

In several of my cases of ovariotomy the operation was performed after the cyst had burst and its contents had escaped into the peritoneal cavity. The peritoneum has been found intensely red, thick, soft, or villous, and occasionally covered by loosely adherent flakes of lymph. Yet the result has been surprisingly satisfactory. The irritating cause having been removed, the irritation has subsided. If the cause had not been removed, death must have happened at no distant period, as all the general and local symptoms of chronic diffuse peritonitis had, in the whole series of cases, followed the rupture. Twenty-four times has this complication presented itself out of the last three hundred of my operations. Five of the patients have died, so that the ordinary rate of mortality of mixed hospital and private cases does not seem to have been much augmented. At any rate, the bursting of the cyst, or the filling of the peritoneum by oozing from the puncture made by tapping the cyst, is no bar to the operation of ovariotomy, but rather a reason for doing it without delay. The fluids found in the peritoneal cavity have been of all kinds—simple, bloody, and fetid; the cyst walls in all stages of degeneration, some even nearly black, with ragged edged openings; and the peritoneum always with the same signs of inflammatory action, though,

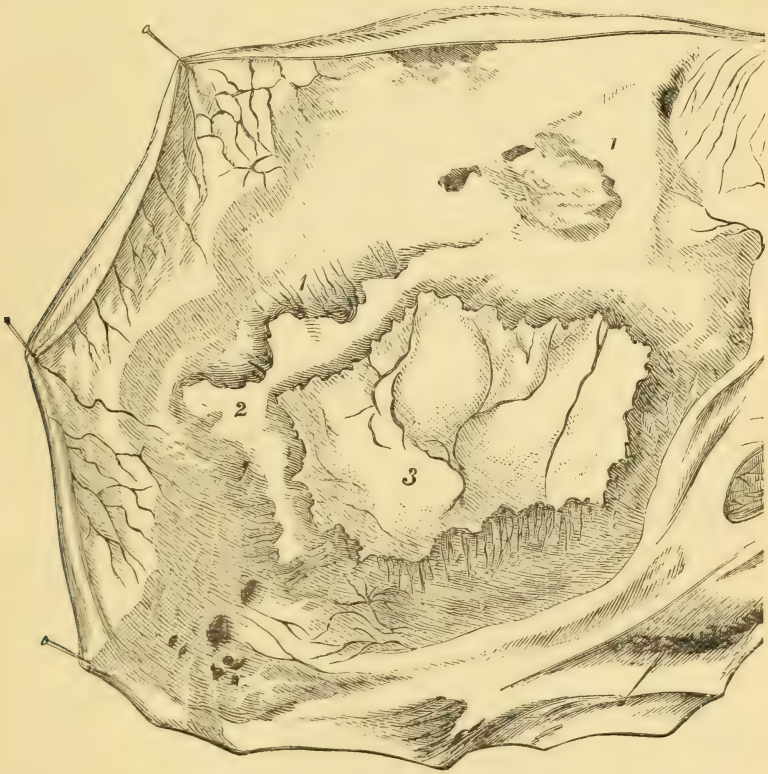
perhaps, in the fatal cases the semi-organised lymph patches were more general.

To illustrate this point in the history of ovarian pathology, it may be well to cite some notes of Case 200, which is a type of all the rest. This patient was a lady, thirty-seven years of age, mother of six children, whom I saw with Sir Thomas Watson and Dr. A. Farre in 1866. I had previously removed an ovarian tumour from a daughter of her mother's sister. An ovarian tumour and vaginal cystocele were recognised, and twenty-three imperial pints of fluid were removed by tapping. The fluid rapidly formed again, and I removed the cyst two months after the tapping. Twenty-six pints of ovarian fluid were free in the peritoneal cavity, and a thin walled multilocular cyst, which appeared to be a simple hypertrophy of the normal constituents of the left ovary, and weighing only two pounds, was taken away. When all the fluid was sponged from the peritoneal cavity, Dr. Farre and I were both struck with the intense vivid redness of the membrane. It was thick, soft, velvety, not obscured by any exudation of lymph, but all over the abdominal wall, the intestines, and uterus, it was as brilliantly red as a microscopical injection. We were naturally apprehensive of the effect of the incision, sponging, and action of air upon a serous membrane in this condition, and I went directly after the operation to tell Sir T. Watson. He said, 'Are you sure you got it all out?' When I answered, 'Yes, quite sure,' he replied, with the wisdom of a great clinical teacher, 'Then let us hope, as the irritating cause is removed, the irritation will subside.' And it did subside. There was no bad symptom. Recovery was complete. She had her seventh child born thirteen months after the operation, and has had another since. Of the many valuable practical lessons for which I am indebted to Sir Thomas Watson, I know of none more important than that he taught in this case. It has been a guide in many others since; and when able to remove an 'irritating cause,' I have almost always found that the irritation has subsided.

In these cases, the common form of degeneration is that into fat. This, indeed, is the most commonly observed stage of retrograde change in these tumours, the primary one being that of an anæmic condition of the fibrous tissue. There are

very few ovarian cysts in which it is not seen to some extent. Here and there are found yellow or light brown patches slightly raised above the general level, with a fatty or lardaceous deposit in the cells of the areolar tissue. This often begins in the epithelial lining, and spreads to the adjacent tissues, involving and pervading sometimes the whole thickness both of walls and septa. In this way, the septa yielding to pressure of the contents, small cavities unite to make large cysts, and large softened cysts burst without ulceration.

The wall of a multilocular ovarian cyst of very rapid growth, taken from a young unmarried Jewess (Case 153), displayed several irregular patches of a dull yellow or brownish colour. On examination by the microscope, the patches in question



were found to consist principally of white fibrous tissue, but no traces of fat could be detected. The colour was probably

due to non-vascularity, the patches being deprived of a vascular supply, owing to the vessels being filled with clot, and being more or less obliterated. The non-vascularity of the patches was due to congestion of the vessels in the immediate neighbourhood, resulting in rupture and extravasation. The cyst wall as a whole was beautifully injected with blood, the portions surrounding the patches only showing extravasation. The extravasated points formed two circumvallated lines, as shown in the accompanying woodcut.

The vessels leading to the outer circumvallation were large and numerous ; those leading to the inner circumvallation being smaller and fewer in number. The patches, with the circumvallated lines, may be said to form three distinct areas :—

1. An area where the vessels were numerous and large, and where great quantities of blood of a bright florid colour were effused.

2. An area where the vessels were smaller and partially emptied of their contents, and where the effusion was less highly coloured and less distinctly marked.

3. An area in which the remnants only of vessels could be traced, and where no effusion was perceptible.

This third or central area was of a dull yellow, running into a dull brownish tint, and contrasted strongly with the delicate hue of the second area.

These appearances are described as seen from within the cyst wall.

That portion of the cyst wall corresponding to the non-vascular area varied in thickness, and not unfrequently became extremely thin ; and when the cyst ruptures, it is at the points indicated.

The further stage of chalky metamorphosis is simply the exchange of the lardaceous deposit in the tissues for that of calcareous matter—a condition quite distinct from that of ossification. This chalky deposit sometimes extends through a large part of the walls of some of the cysts, and makes them rough, uneven, and easily broken. The superficial plastic deposits thrown out upon the peritoneal surface, and its adhesions, give a temporary respite from rupture in some of these cases.

In 1865 Rokitansky published a paper on ‘The Strangula-

tion of Ovarian Tumours by Rotation.' The tumour turns upon its axis, and the pedicle is twisted sometimes as much as two or three times round. The occurrence is not at all rare. Rokitansky has given the particulars of thirteen cases, eight of which he found in making autopsies after fifty-eight deaths from ovarian disease. The same thing has been observed during my operations at least some twelve times, and no doubt it has at others escaped notice. In two cases it caused death before operation.

The direction of this rotation is not at all constant; sometimes being inwards towards the median line, sometimes the reverse, outwards. The tumour may also rotate obliquely, turning over backwards or forwards. In outward rotation the Fallopian tube becomes spiral, if not adherent to the tumour, round its pedicle; if adherent, round both tumour and pedicle. In inward rotation, the first half turn pushes the tube inwards and backwards. Should the rotation continue, then the tube forms a spiral round the back of the tumour. Or it may be altogether exempt from participation in the turning. The uterus is pulled in the direction of the rotation. These movements seem occasionally to take place suddenly and quickly; but they are also gradual in other cases; may be reversed, and recur. Where the rotation is not complete, the motion may become, as it were, slowly oscillating. The pedicle sometimes gives indications of these changes having taken place repeatedly or habitually; and general symptoms, such as sudden accession or increase of pain, change of other sensations from altered relative position of the tumour and viscera, and perhaps some difference in the external contour of the belly, may enable us to conjecture the time of their commencement.

But if the rotation has taken place and the pedicle has become twisted, and no unwinding of it follows, what may be the consequences? The great veins are compressed, and blood continues to pour in by the arteries. Congestion, exudation of serum, extravasation of blood into the cysts, and rupture follow in rapid succession, and unless timely relief is afforded by ovariotomy, the patient soon sinks. If the rotations are so complete and enduring as to strangulate the arteries of the pedicle, gangrene is inevitable. But supposing the revolving

of the tumour to be accomplished more tardily, nutrition is only impeded, and the more happy result of shrivelling of the walls of the tumour, with absorption of the contents, occurs. The remains of such tumours have been found sometimes in Douglas's space as a hard, solid, partly cartilaginous substance. Inflammatory adhesions binding down the pedicle have also, without twisting, brought about the atrophy of an ovarian tumour. In other instances, the constriction of the vessels by the change of position is so moderate that the tumour itself is not much affected, but it remains stationary, and contracts adhesions to some of the viscera, and cannot be replaced. Rokitansky mentions one case in which a strong cord-like band so ligatured the sigmoid flexure of the bowel, that the slightest change of position rendered it impermeable. The bowel has also got so entangled with a long pedicle, during rotation, as to become strangulated. The immediate performance of the operation of ovariotomy might even be rendered necessary, under such circumstances, for the release of the compressed and obstructed intestine. Even after new vascular alliances have been formed between the rotated tumour and the omentum or viscera, the pedicle has by some means, either tension or pressure, been divided. In such a state of transplantation, the tumour has drawn its nutriment through the newly formed vessels of the plastic adhesions, and its parasitic existence has not been much less vigorous than before. Two examples of these self-grafted tumours have come under notice among my ovariotomies. In the operation in Case 110, performed in November, 1864, the incision extended from two inches above the umbilicus to five inches below it. There was no adhesion to the abdominal wall, but the omentum was strongly attached to the upper part of the cyst, and interlaced with mesentery from below. I tapped several large cysts successively, got the tumour out, and then found there was no pedicle. It appeared that the tumour derived its vascular supply solely from the omental and mesenteric vessels. The fundus of the uterus felt rough, but there was no tear nor fracture at the point where the Fallopian tube must have separated, nor was there any bleeding; there was pretty free hæmorrhage from the omental vessels. I cut away some shreds of omentum, and tied at least twelve vessels with

very fine silk, cutting off both ends of the ligatures close, and returning the omentum with the tied vessels into the abdomen. The other ovary was found in its natural position, but enlarged and diseased. It too was removed, the patient was soon fully re-established in health, and is still in 1872 quite well. The second instance (Case 419) was that of a married woman with five children, 38 years of age, whose mother died of dropsy with abdominal tumour. For eighteen years and through all her pregnancies she had carried a dermoid cyst. When two months advanced in pregnancy (May, 1871) I operated on her without hindrance to the gestation. The tumour being dermoid, its contents would not pass through the trocar, but gushed out from the puncture. The cyst was then drawn out, large shreds of very vascular omentum and a coil of intestine growing to it. On separating the omentum and intestine, it was found that there was no pedicle. The blood supply of the cyst had been kept up by the omental vessels, and some large vessels near the cæcal appendix, where the intestine appeared thick and contracted. Several vessels and shreds of omentum were tied, and returned with the ligatures cut off short. At the full term of pregnancy a living child was born after a natural labour in December, 1871.

Many of the evils and discomforts which accompany the progress of a case of ovarian tumour arise no doubt from its mere mechanical interference with the organs in the chest, pelvis, and abdomen—displacing and compressing them, impairing their nutrition, and disturbing their functions. But the pressure of the gravid uterus is as great, or even greater, and a woman in pregnancy has sometimes to endure annoyances or even real miseries. Still the process is natural, and there are compensations in the shape of local adjustments, and temporary accommodating changes of form, and mental considerations, and moral influences, which are wanting to the victim of ovarian disease. Instead of being cheered by the hopes and aspirations of maternity, she has to bear the torture of suspense or despair; her blood is impoverished, and her nervous system shattered by imperfect assimilation; and one is justified in more than suspecting a local protesting resistance to the growth of the invading tumour. After a time, the emaciation, always going on, and the weary, cheerless self-

watchings, made inevitable by the incapacity to use healthful exercise or to undertake the usual occupations with success,

chisel out the features into the peculiar pinched expression which has been described as the *facies uterina*, but which would probably be better named *facies ovariana*.

The drawing, which is an exact copy of a photographic portrait (by Dr. Wright), gives a very correct idea of this peculiar physiognomy. The emaciation, the prominent or almost uncovered muscles and bones, the expression of anxiety and suffering, the furrowed forehead (not sufficiently marked in the drawing), the sunken eyes, the open, sharply-defined nostrils, the long compressed lips, the depressed angles of the mouth, and the deep wrinkles curving round these angles, form together a face which is strikingly characteristic.

The tumour begins to grow on one side, where it occupies space wanted for the large intestine with its accumulations, and no provision is made, as for the uterus, for its expansion or for the due maintenance of its relative position in respect to the viscera. All is irregular and wrong. At first the weight makes it settle down into the pelvis, where it causes

irritation of the vagina and rectum. Mounting higher with augmenting bulk, the large intestine, according to side, gets jammed, and the fæcal matter impacted; the uterus is displaced, thrust down, or to one or the other side, retroverted or anteverted; and, as the case advances, is dragged up by its attachments so as to be out of reach of the finger in the vagina. Its form is distorted, and its functions rendered difficult and painful, though not absolutely impossible; for, as it has been already seen, there are many coincident cases of even successful pregnancy. The urinary organs seldom escape at any stage of the disease. When the pressure is on the bladder, micturition is either troublesome, impossible, or distressingly urgent; with strain upon, or pinching of the ureters, there may be stoppage of the flow of urine, or suspension of its secretion, or poisonous reflux into the system. Even the kidneys may be flattened and almost annihilated. The vital

organs in the chest suffer in many ways, and the chest symptoms of oppressed action are often among the most tormenting,

Œdema, ascites, and pleural effusion, especially on the right side, occasion the greatest aggravation of misery; and the consequent distensions of the ribs and spine are so indisposed to readjustment, as to amount to serious hindrance to recovery after tapping. More than once the ribs, which have been thrown out like a fan, with the intercostal structures over-stretched, have refused to return to their normal condition; the lungs, which had been confined to a very small space, had so far lost their resiliency that air could not easily expand them again; or the pleural cavities, filled with fluid, have not been freed by absorption, and the patient has died from want of breathing power. Occasionally the same difficulty has been met with after ovariotomy, and a patient in whom repair has gone on well so far as the abdomen was concerned, has had her recovery greatly retarded, or has died simply in consequence of the state of her chest. The two accompanying

portraits show well how limited the breathing space sometimes becomes in consequence of the excessive growth of the tumours.

CHAPTER V.

CONTENTS OF OVARIAN CYSTS.

There are endless differences in the contents of ovarian cysts, and these differences seem to be in no way dependent on the form of the cysts or the anatomical arrangement of their tissues. Even the many strange epithelial developments are not accompanied by any special kind of fluid. In the simple, unilocular cysts, it is most common to find a perfectly clear, hyaline, colourless, pale yellow, or straw-coloured fluid. But it is not necessarily so, for all sorts of gradations of colour and thickness occur, from clear and thin to a dark jelly, or even a semi-solid, almost friable and crumbling colloid. Albumen is generally present in the more serous contents of cysts, but in no certain proportions. Scherer has demonstrated the presence of paralbumen and metalbumen as albuminates peculiar to ovarian fluids. They have a close resemblance to the serum of the blood, only that the salts are in greater proportion. Fibrinogen is also a constituent, and may be demonstrated by applying Dr. A. Schmidt's test, which is the addition of a few drops of blood to the fluid, when a distinct clot will form in from twenty-five to ninety minutes, involving the blood corpuscles which had been added. The clot is generally so firm that it can be raised unbroken, and if squeezed in the hand a quantity of fluid issues out, leaving a loose bundle of fibrillated substance. Klob divided the contents of an ovarian cyst into two portions. Into the one he poured a few drops of blood, and at the end of three hours the whole was converted into a mass as solid as jelly, while the other portion without blood showed no signs of coagulation, even after long standing. Fibrinogen, however, is also found, according to Schmidt and Virchow, in other serous secretions and in ascitic fluid. There are sometimes traces of sugar. Occasionally, even in the perfectly clear fluid of simple cysts,

there are considerable quantities of cholesterine crystals, which, after standing, form a glittering pellicle on the surface. Scales of epithelium are almost always floating in these fluids. Pus and blood are found in different conditions; in some cysts they are mixed with the clearer fluid. Among the many cysts of a compound tumour, some may be seen with almost pure serum, others with pus and offensive gases. Blood often mixes with the other contents, and influences the colour as well as other qualities. The yellow, green, brownish, or red tints depend upon the admixture of blood and pus, which may be recent and pure, or old and undergoing changes. The turbidity of the fluid generally depends on the admixture of these secondary matters. Blood is not unfrequently effused into the smaller cysts, where it sometimes becomes fibrillated and partially organised, though it more frequently runs into a state of decomposition.

The more consistent colloid substances are occasionally distributed in ovarian cysts in a very peculiar manner. They form conical columns with their broad bases directed outwards. Between these almost isolated columns, a whitish or yellowish white matter, consisting of epithelial cells in a state of degeneration, is placed without any definite arrangement. Such cysts have probably been formed by the confluence of several smaller cysts of which nothing remained but the epithelial investment, undergoing fatty decay, and so tracing out the former lines of separation.

The chemical examination of colloid substances has given results of the most contradictory kind, but this may be explained by the supposition that operators have not dealt with the matter in the same stages of transformation. Scherer pointed out the relation of metalbumen to mucin, both coagulating at high temperatures, the coagulum being soluble in boiling acetic acid, and being similarly affected when treated with alcohol and mineral acids. He raised the question whether metalbumen ought not to be considered as a transition state between albumen and mucin or colloid matter, colloid always containing mucin in large proportion.

Contents of the Graafian Vesicle.

The normal Graafian follicle of the healthy ovary contains a minute quantity of a slightly viscid, whitish yellow, albuminous fluid resembling the serum of blood. It is alkaline, of pale whitish yellow colour, and transparent. It is not ropy nor viscid, but limpid, readily separating into minute drops. It contains a small quantity of a substance which will coagulate when treated with acids or alcohol, or when exposed to a raised temperature. It holds in suspension spheroidal, nucleated epithelial cells and shreds of epithelium from the membrana granulosa of the ovisac. These nuclei and cells, which are spheroidal in the human female, are prismatic in certain classes of animals. In the rodents ciliated epithelium will be found, although only a small number of the cells possess vibrating cilia.

In the human female, even in the normal condition, these cells occasionally become granular, and filled with fatty granules. When this is the case, they appear much darker than the surrounding non-granular cells.

After the rupture of the ovisac it would appear that the fluid contents, or 'ovarine,' escape into the peritoneal cavity ; but the quantity is so minute that it can hardly do more than moisten the fringes of the Fallopian tube. There is not enough to penetrate into the tube.

Contents of Ovarian Cysts.

Under certain pathological conditions, by which either the Graafian follicles enlarge or new cavities are formed, the contained fluids are altered, and may conveniently be arranged in three groups, according as they resemble the normal fluid of the ovisac, or as they become more or less ropy and viscid, or as in consistence they resemble mucus.

The fluids of the two last groups are frequently met with in multilocular cysts, and in the alveolar and colloid tumours of the ovaries. In the following account of the chemical composition of all these fluids, and of the microscopic characters of the elements of the cysts, Eichwald's elaborate Reports and Drawings, published in 1864 in the Wurzburg 'Medizinische Zeitschrift,' have been freely used.

1*st Group*—(*Abnormal Fluids, very Liquid.*)

The fluids of this group are generally found in unilocular cysts with a smooth internal surface, invested with a layer of pavement epithelium. The latter may be destroyed in places by hæmorrhage, or by the growth of granular vegetation.

The clear fluids are much less frequently met with than those of the following groups. They are distinguished by the small quantities both of coagulable substances, and of substances soluble in water, which enter into their composition. They are perfectly liquid, in no degree ropy or viscid. They are transparent, pale lemon-coloured, or colourless, and of specific gravity of 1003 to 1006. They have no odour, and are either neutral, or slightly alkaline. Occasionally epithelial cells are found in suspension, somewhat interfering with their usual clearness and transparency.

The following analysis may be taken as representing the average contents of these fluids:—

Water	982·5
Mineral salts (sulphates, chlorates, and phosphates) .	12·0
Organic salts (lactates)	4·0
Cholesterine . . . occasionally traces	
Albuminose	1·5
	1000·0

These fluids are devoid of fat and albumen. Heat and nitric acid will neither coagulate nor precipitate them; in some cases will merely cause the faintest turbidity.

In the clear, slightly ropy fluid of some of the small cysts in the broad ligaments, minute flakes are occasionally found, either isolated or agglomerating in small lumps, which float in the fluid or adhere to the inner surface of the cyst. These bodies vary in size. They are polyhedric, with rounded edges, and convex or slightly depressed concave facets. They have a dark, well defined outline, although they are colourless and but slightly refractive. When present in considerable number in a cyst the size of a pea, they render the fluid opalescent or grayish. Among them, there are sometimes others spherical, with sharp, dark outlines. Their substance is transparent, delicately granular, with a minute round, or irregular, cumulus

of fatty granules in the centre. All these bodies have the consistency of wax, break up easily when enlarging, or burst at the edges.

2*nd Group*—(*Liquid but Ropy Ovarian Fluids.*)

These fluids are more or less ropy, of the consistence of oil or syrup, and frothing when shaken.

They are clear, amber or lemon-coloured, or pinkish, like the peritoneal fluid. The reddish fluids after standing deposit the red blood-corpuscles to which they owe their colour, and then become transparent and of the original colour.

These fluids may become turbid and of grayish, yellowish-green or whitish colour, from the presence of cells and oil-globules, which they hold in suspension. Sometimes grayish flakes will be met with, which contain cells and oil-globules, held together by an amorphous, delicately granular substance. They have a faint, sickly, insipid odour. Their reaction is alkaline; their specific gravity varies between 1009 and 1018. Heat, alcohol, and nitric acid will coagulate them like blood or ascitic fluid.

Baedeker, Thudichum, and other chemists have found *leucine* in the fluids of ovarian cysts. Bright gives the analysis of such a fluid, which was clear, slightly mucous, alkaline, and of 1018 specific gravity:—

Water	940·10
Chloride of sodium	3·76
Carbonate of soda	1·70
Sulphate of soda, Phosphate of lime, Fat	traces
Albumen	47·75
Soluble albumen	6·69
	1000·00

The substance which Bright calls 'soluble albumen,' and other authors call incoagulable albumen, is probably identical with Scherer's metalbumen, which he discovered in 1852, co-existent with albumen in a non-viscid fluid from an ovarian cyst.

Béchamp and Saint-Pierre examined another ovarian fluid, which was milky, yellow, and ropy:—

Water	955·0
Mineral salts	7·0
Fat and cholesterine	4·0
Extractive matter	0·6
Albumen	30·2
Incoagulable albumen	3·2
	1000·0

In the fluid there will generally be a varying quantity of epithelial cells; principally the pavement-epithelium, which lines the cavity of the cysts. They do not render the fluid turbid, but merely give it a slightly brownish tint. They are found sometimes in such quantities as to form a grayish deposit at the bottom of the vessel after several hours' standing of the fluid. Without pathological importance, they are physiologically interesting as illustrating the modifications which epithelial cells are liable to undergo when kept in suspension in a fluid from which they cannot be eliminated.

Besides these epithelial cells, there will be always white blood-corpuscles, either of granulated or normal appearance. Sometimes red blood-corpuscles, due to capillary hæmorrhage from the inner surface of the ovarian cyst, are found in these fluids, to which they communicate a brown or dark brown chocolate tint.

Red blood-corpuscles, when deprived of the contact with oxygen, undergo certain alterations. They lose their spherical shape and elasticity, and become softer, elongated, and when in denser aggregation, even permanently polyhedric, or cuneiform. At the same time their vivid crimson colour changes into dark brown or chocolate. This tint, which ovarian fluids frequently present, is entirely due to modifications of deoxygenated red blood-corpuscles.

The fluid in very old cysts becomes thicker, and assumes the consistence and colour of coffee-grounds. In these fluids there are, moreover, irregular shaped spheroidal granules of hæmatosine from disintegrated blood-globules. The colouring matter decomposing more slowly than the azotised matter in the blood-globules or the globuline, the hæmatosine conglomerates in small lumps. Many of the red blood-corpuscles may also be found hypertrophied, and filled with fatty granules.

There will be granulated red blood-corpuscles, and epithe-

lial cells undergoing metamorphosis, in every instance of chocolate-brown ovarian fluid. Fibrine, however, will not be found.

3*rd Group*—(*Viscid and Ropy Fluids.*)

These fluids or substances are generally clear, colourless, or of a grayish tint, and semi-transparent. They are viscid, adhesive, resembling the vitreous humour of the eye, or inspissated mucus, and may be pulled into threads or ropes; or they are more like thick jelly, breaking up into lumps. They will not pass, or pass only with difficulty, through the canula of a large trocar.

The fluids of this group are either odourless, or of a faint smell. Their reaction is alkaline or neutral, and their specific gravity ranges between 1010 and 1015; in colloid cysts it is as high as 1040 or more. They coagulate when exposed to high temperature, just like the white of egg, to which they sometimes bear a close resemblance. Some are more like synovial fluid; others like mucus may be drawn out in long slimy filaments; others are like calf's foot jelly; and again, others whitish semi-opaque like arrowroot boiled with milk. These varieties depend upon the condition of their principal components—the colloid bodies and the mucus—and the intermediate stages of metamorphosis from one to the other.

Occasionally, the mucus-like fluids contain grayish, whitish, or yellow roundish spots or streaks, which are due to agglomerations of numerous granules. Besides, there are always cells of prismatic or of pavement-epithelium, either undergoing fatty metamorphosis or hollowed by minute cavities; free nuclei of epithelial cells, and irregular white blood-corpuscles; and in coloured fluids, decayed red blood-corpuscles, hæmatosine, and pus-corpuscles.

They contain also certain quantities of mineral salts, crystals, or crystallizable principles of organic origin, as fats and certain principles nearly allied to alkaloids, viz. urea, creatine, leucine, creatinine, &c.

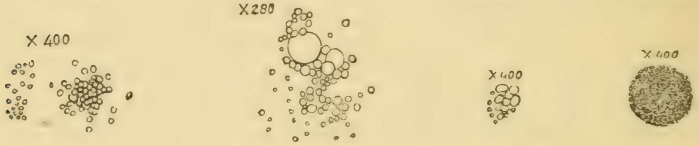
Those interested in a quantitative analysis of these fluids may find several in Eichwald's paper.

Microscopical examination of the substances found in

ovarian fluids.—A magnifying power of 300–550 diameters will prove the most useful in the examination of ovarian fluids under the microscope. Some fluids, especially colloid fluids, are so rich in forms, that a drop placed on the glass slide will perfectly darken the field. It will therefore be advisable to dilute them sufficiently with water, so as to bring the outlines of the component elements clearly into view. Besides the epithelial cells thrown off from the surface of the cystic cavity, the following elements will be met with, either singly or mixed, according to the characters of cyst and fluid.

1. *Fatty granules* varying in size. The smallest appear merely dark, dust-like spots, whilst the largest are granules with well-defined margins, and strongly refract the rays of light (fig. 1).

Fig. 1. Fig. 2. Fig. 3. Fig. 4.



There are also isolated larger fat drops (fig. 2).

2. *Globular aggregations* of varying size, entirely consisting of granules (fig. 3), which are frequently observed breaking up (fig. 5).

Fig. 5. Fig. 6. Fig. 7.

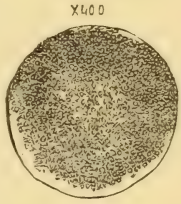
Some have regular round outlines, others torn or beaded edges (fig. 6).

Some are without any visible envelope (fig. 4); others are surrounded with a delicate dark margin, leaving a measureable interstice between the granules and their envelope (fig. 7).

The latter may be easily mistaken for nucleated cells, to which they bear a close resemblance.

Under the compressor, these aggregations of granules burst into single granules, which generally flatten from the pressure and become confluent. Where the aggregations are surrounded by a dark margin, it may be frequently observed how that margin gradually removes from the enclosed granules, becomes fainter, and finally disappears. No breaking up of an envelope can be observed. They consist merely of fatty granules, agglomerating to a globular mass, and bound together by homogeneous substance (fig. 8).

Fig. 8.



Sometimes there is sufficient quantity of that substance to form a luminous zone around the granular agglomeration, but in such a case it will be semi-fluid like the substance of the colloid-globules.

3. *Large, colourless colloid-globules* with delicate margins and a clear transparent centre, either perfectly homogeneous (figs. 9, 10, 11), or dotted with fine black spots (fig. 12).

Fig. 9.

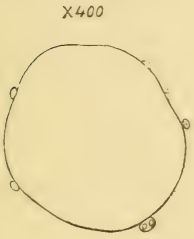


Fig. 10.

Fig. 11.

Some of the colloid-globules reach such a size as to fill up two-thirds of the field. They are pliant, and appear perfectly globular when isolated. When, however, in contact with other bodies, they adapt and shape themselves in some degree to the intervening space, or to the outlines of the bodies with which they are in contact, and become elongated, caudate, or notched. Their surface frequently presents indentations and impressions from neighbouring bodies. They

Fig. 12.

have also considerable adhesiveness, and other microscopic elements which float in the fluid cling to and move with them (fig. 9).

The smaller and the larger colloid-globules behave differently under pressure.

The small globules, which possess a high refracting power, and are slightly granulated, burst when compressed. They begin tearing in their periphery (fig. 13), and may split up to the centre, so that the globules divide into several segments. More commonly these rents affect only the external zones, which under continued pressure expand in all directions, growing fainter by degrees, and ultimately becoming invisible. The fluid part of the colloid-globules, however, has never been observed escaping through the rents; and no membranous fragments remain, which could be taken for a burst pellicle. Such colloid-globules therefore consist probably of lumps of a moderately resistant, but jelly-like substance.

Fig. 13.
×400

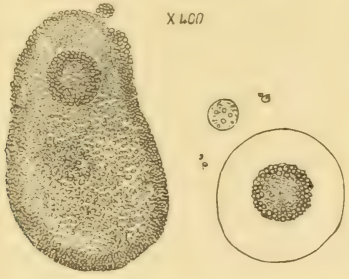
The larger colloid-globules will not burst when similarly treated. A gradual expansion takes place without materially disturbing their circular shape; but the outlines grow fainter and fainter, and at last entirely vanish from the field.

If the opinions of Virchow, who considers the colloid-globules as *germinative spaces or cavities* (*Brutraume*), or of Rokitansky, who describes them as *colloid-vesicles* (*Colloid-Bläschen*), be correct, the colloid-globules possess an exceedingly delicate and elastic pellicle, which yields to pressure without tearing. This theory, however, is contradicted by the following phenomena:—If the margins of two adjacent colloid-globules touch under pressure, they will not immediately flow together, as two drops of a watery fluid do, but a straight, dark line of demarcation forms between them, and remains for some time, whilst the globules continue to spread in other directions. By increased pressure, however, that boundary line disappears, and the colloid-globules become confluent. These larger colloid-globules, therefore, like the smaller ones, appear to be drops or lumps of a semi-fluid, jelly-like substance without pellicle or external membrane.

4. *Similar Colloid-globules enclosing one or several round*

granulated aggregations.—Globules with one such group of granules are more commonly met with. They generally are smaller, and of a circular shape (figs. 14, 15).

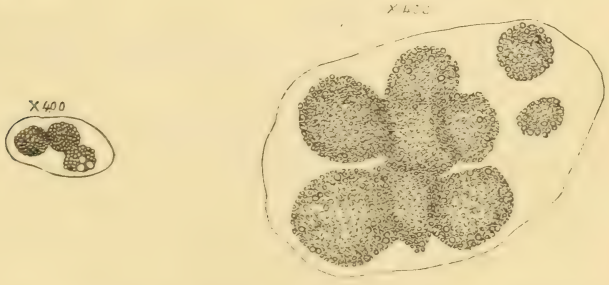
Fig. 14. Fig. 15.



In some globules but a narrow interstice between the central groups of granules and the surrounding margin exists, and they are nearly identical with those free agglomerations of granules with a delicate dark margin, which have been already described (No. 2). (See figs. 7, 8.)

Colloid-globules, containing several agglomerations, have an irregular form, dependent on the number and arrangement of the granular groups. Their convexities will correspond with the masses, and the intervening sulci with the interstices between them (figs. 16, 17).

Fig. 16. Fig. 17.



There are sometimes as many as ten granulated groups in one colloid-globule. Occasionally a breaking up of these agglomerations within the colloid-globules may be observed. The effect of the compressor on colloid-globules with one or several granular aggregations is somewhat similar to that on other

colloid-globules: they flatten, enlarge, and the margin gradually fades away. The groups break up into isolated granules, which may become confluent, but never completely disappear.

5. A large quantity of *small circular corpuscles*, clear, with a dark margin, containing a varying number of fine black molecules, and sometimes also several larger granules of high refracting power (fig. 18). They appear to be identical with the *pyoid bodies* of Lebert, or the *exudative cells* (*Exsudats' Zellen*) of Henle.

Fig. 18.

These bodies disappear entirely when acted on by the compressor, but do not burst. The enclosed granules remain visible in the field.

6. Colloid-globules which contain transparent flakes, of a firm, semi-fluid substance, occur more rarely (figs. 19, 20).

Fig. 19. Fig. 20.

This substance is colourless, sometimes finely granulated, or homogeneous, and of a peculiar faintly luminous appearance like fat.

The flakes vary in size, and are frequently arranged in regular rows within the colloid-globules. Their shape depends on mutual pressure, and they are sometimes circular, or polyhedric, or irregular. In other respects they resemble the pyoid bodies.

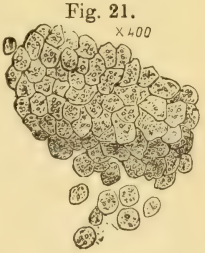
Under the compressor the flakes become confluent into one mass, which is bordered by a delicate marginal line. This line gradually increases in circumference, grows fainter, and disappears. Only a few isolated granules remain as dark dots.

7. Sometimes flakes of a semi-solid transparent substance will be found together in the shape of circular or oblong lumps, but without a common envelope. The absence of a marginal

line will distinguish them from the bodies described above (No. 6), (fig. 21).

Frequently these lumps will break up into single flakes, which may then be observed floating in the fluid.

Fig. 21.



In none of these bodies can a genuine cell membrane or nucleus be discovered. Most likely they are all products of a retrograde metamorphosis. Those which have been likened to pyoid bodies, may be either new formations or elements already decayed. If the latter, they may have originated either in an atrophic shrivelling of cells, or in a swelling out of free cell nuclei.

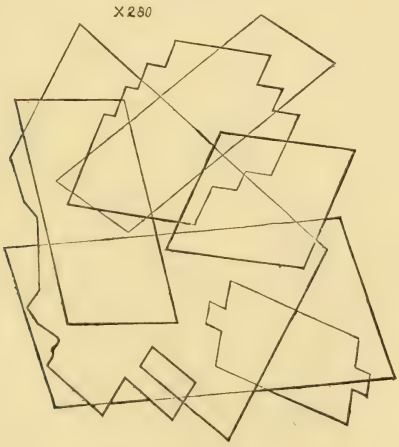
Some other formations may be also found in ovarian fluids.

8. Flat scales of horny epithelium (Horn-cells) (fig. 22).

Fig. 22.

9. *Cholesterine crystals* in great quantities. They have a low specific gravity, and when left undisturbed for some time, form a silvery, glittering pellicle on the surface of the fluid (fig. 23).

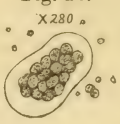
Fig. 23.



10. *Pigment* of dark-brown, reddish-black, or black colour, in granules of different size, sometimes grouped in larger

masses, often isolated, and occasionally imbedded in colloid-globules (fig. 24).

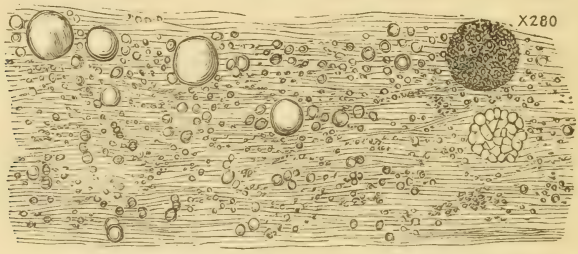
Fig. 24.



Microscopical Examination of the Alveolar or Trabeculated Framework of Cystic Tumours.

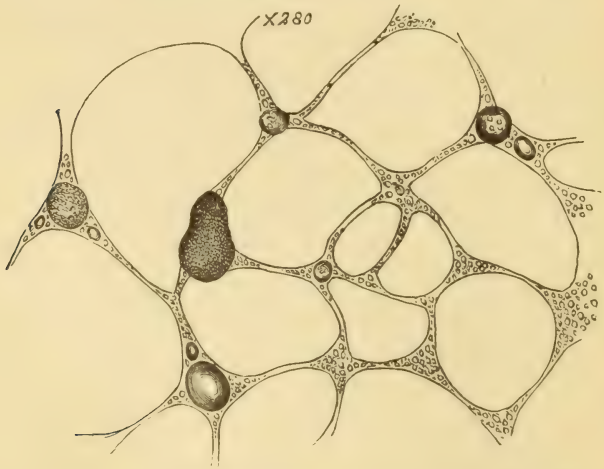
a. The walls of the alveoli.—The alveoli near the base of the tumour, consist mostly of an areolar tissue interwoven with

Fig. 25.



elastic fibres. The stroma will be found undergoing a retrograde transformation; at some distance from the cyst-cavity

Fig. 26.



in various stages of fatty metamorphosis; the innermost layers being reduced to the condition of fat globules (figs. 25, 26).

The smaller cysts and alveoli, which lie either isolated or in groups in that stroma, have no proper continuous membrane, but are simply invested with fasciculi and laminæ of areolar tissue. Where these fasciculi are sufficiently strong to resist the pressure of the contents the alveoli assume an irregular shape. If, on the contrary, the areolar tissue is delicate and thin, they appear more or less globular. Several alveoli grouped in close apposition, and separated merely by a delicate lamina of areolar tissue, yield like a small cyst under the pressure of a denser tissue. Large globular cavities, imbedded in a denser stroma, are often subdivided by thinner laminæ or trabeculæ into lesser loculi. The alveoli communicate with each other, when from partial atrophy the septa are destroyed. In such a state the structures may be called *areolar* in distinction from the genuine *alveoli*.

The majority of the alveoli are lined with a columnar or pavement-epithelium. Sometimes the cells have an irregular shape like that of the 'transition epithelium' of Henle in the bladder. The epithelial lining is generally covered with a layer of a semi-opaque matter consisting of exfoliated cells, colloid-globules, granulated cells, horn cells, or pyoid bodies.

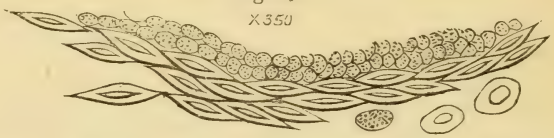
The tissue between the minute alveoli is often only embryonic. Sections of it may be easily distinguished by their appearance, and offer a good opportunity for studying the different stages of development of areolar tissue. It is less dense than the mature tissue, is semi-transparent, of grayish-white or milky colour, and very brittle, tearing readily in all directions.

At some places the stroma consists almost entirely of closely aggregated free nuclei, either globular and irregularly distributed, or ovoid and arranged in regular layers. The stroma of tumours which Rokitansky describes as *carcinoma fasciculatum*, the fibro-nucleated tumour of Hughes Bennet, shows a similar arrangement. The nuclei are bound together by an interstitial mucous substance, which only becomes visible by adding acetic acid; the nuclei shrink, their outlines become more distinct, and the interstitial substance coagulates in the form of threads, which make a sort of network. The nuclei are mostly without nucleoli; sometimes they have one or two. Nuclei with two nucleoli are often found in the act of dividing.

At other places the nuclei are in a more advanced state of development, and are found as fusiform cells, or as genuine fibre cells, combined into meshes around circular interstices. The alveolar arrangement of the tissue, characteristic of cystic tumours, originates in this way.

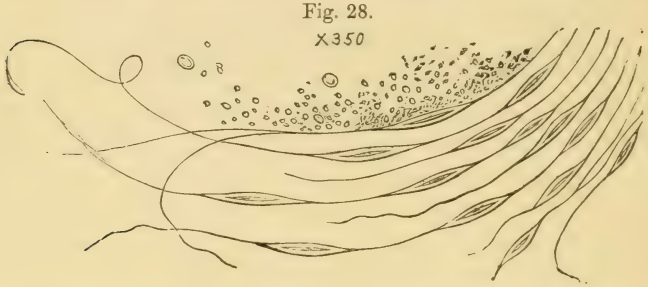
The trabeculæ of the alveolar stroma consist of areolar tissue in various stages of development. In the newly formed parts the cells are oblong, with a large nucleus, the cell-wall scarcely distinguishable, and soluble in acetic acid. In a more advanced condition the cells are seen to be longer, fusiform, less readily acted on by acetic acid, and arranged in parallel rows (fig. 27).

Fig. 27.



Elsewhere, as fresh matter is deposited between the rows, the

Fig. 28.



cells are more compressed, become connected one with the other by their pointed ends, and fibrillation commences (fig. 28).

Fig. 29.

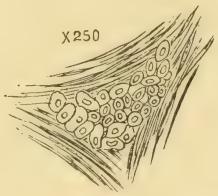
The intercellular substance of the trabeculæ possesses the chemical properties of *mucin*; when treated with acetic acid it coagulates into threads. In some portions of the denser stroma alveoli may be found occasionally, the walls of which consist of fasciculi of genuine fibrous tissue. Their interstitial substance presents a fibrillated appearance and swells in acetic acid; but the cells differ in no respect from the cells of fibrous tissue (fig. 29).

Among these alveoli there will be some, the walls of which consist of a delicate homogeneous tissue with

a few isolated fusiform cells which are very difficult to demonstrate.

The meshes or alveoli of such recent tissue are of varying size. The smallest have their shape modified by the direction of the trabeculæ (fig. 30).

Fig. 30.



The larger alveoli are more or less circular (figs 31, 32, 33).

Fig. 31.

Fig. 32.

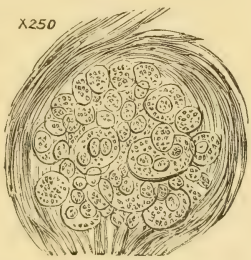
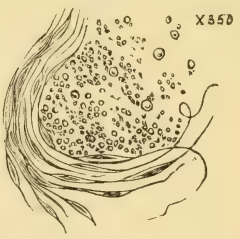


Fig. 33.



The spaces are filled up with cells and nuclei, mostly in state of segmentation. The majority are small, globular, transparent bodies with an exceedingly delicate margin, rendered more distinct by addition of water (figs. 34, 35).

Fig. 34.

Fig. 35.

Acetic acid makes such bodies shrink; any alkali dissolves them rapidly. Many are free nuclei. The only remarkable

thing about them is their great variety in size. In some alveoli they have an oblong or elliptic shape, following the direction of the trabeculæ (fig. 31).

Most of these nuclei are perfectly homogeneous; others contain several minute granules of high refracting power, which appear as black spots. Many of the nuclei enclose one or two nucleoli; or the nuclei are constricted preparatory to division.

Some of the alveoli are so densely filled with cells, that intercellular substance can scarcely be discovered; others may be found entirely devoid of cells. They contain instead a mucous substance, rendered more distinct by addition of water, which makes it contract. It coagulates into membranous threads when treated with acetic acid, and dissolves in alkaline solutions.

The nuclei often undergo an early retrograde metamorphosis; sometimes even previously to the complete development of the trabeculæ. In such decaying nuclei no nucleoli can be discovered; only fat globules. They are generally larger than younger nuclei, have a peculiar opalescent appearance, may be found even in minute alveoli in great quantities, and are in every respect like genuine colloid-globules. These globules frequently become confluent, forming larger amorphous masses.

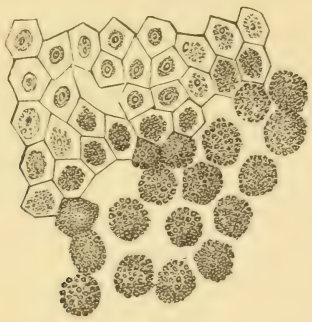
In other alveoli the nuclei continue their further development into genuine cells. This will be the case especially with nuclei nearest to the walls of the alveoli, as being more accessible to the nourishing material (fig. 30).

The smaller cells, the nuclei of which are merely surrounded with albuminous substance, have no visible pellicle or cell membrane. They readily dissolve in acetic acid without leaving a residue, and by compression break up into irregular segments. It is impossible to discover the tearing of a real membrane or the escape of fluid contents. The older cells will tear and collapse. The contents of such cells are somewhat turbid and granular, but acetic acid renders them clear almost immediately. The membrane resists a longer time the action of acetic acid. Many cells are in the act of segmentation. They behave exactly like the so-called *mucus-cells*.

The inner surface of the walls of alveoli of considerable size is invested with a layer of epithelium, which gives the character of true cysts. If the alveoli are very densely filled, the

cells on the wall will be flattened, and resemble pavement-epithelium; many of the cells are in different stages of fatty degeneration (fig. 36).

Fig. 36.



If, on the contrary, the alveoli are less densely filled, the epithelial cells will develope in radial directions, and from lateral compression will assume the appearance of cylinder-epithelium (fig. 37).

Fig. 37.

Fig. 38.

In exceptional cases ciliated epithelium is intermixed with the cylinder-epithelium (fig. 38).

Many of the cells like the nuclei are transmuted into colloid-globules.

Fatty decay of the histological elements is a more frequent occurrence in large alveoli. In the smaller alveoli it may be observed when their walls are exposed to a high degree of pressure or traction from neighbouring cysts. In such cases the cavities of small alveoli have almost disappeared, and can only be traced as slit-like interstices. There will be very little fluid, or none at all, in such compressed alveoli, but merely a minute quantity of a thick, sticky substance, composed of the débris of the contents. This will throw some light on the

conditions of mucous metamorphosis and fatty degeneration. Mucous metamorphosis appears always compatible with a certain degree of nutrition, whilst fatty degeneration takes place in proportion to the defect of nutrition. If an alveolus is exposed to pressure, the capillaries in its walls will be the more completely compressed as the surrounding tissue is less resistant. The thickness and solidity of the walls of an alveolus are generally in an inverted ratio with the size of its cavity; and when several lesser alveoli coalesce into a larger cavity, the thinner and more delicate septa are destroyed earlier than the thicker and more solid partitions. Fatty decay takes place in alveoli which have become atrophic through pressure.

In large colloid cysts fatty decay is a very common occurrence, and portions of the walls and septa are destroyed. It presents itself to the naked eye in irregular patches of dirty brown or yellow colour, bordered by the raised edges of the surrounding healthy tissue. They are brittle, and easily broken up. The lining epithelium has also undergone fatty metamorphosis. These changes are due to the compression and obliteration of the capillary vessels. In some cases these vessels may be traced filled with a brown finely granulated substance. Hæmorrhage frequently takes place from such partially destroyed vessels.

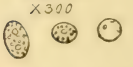
The fatty decay of the contents of such cysts depends, according to Eichwald, on being separated from the nutrient vessels by a layer of thick, mucous substance, which obstructs the osmotic process.

b. The Contents of the Alveoli.—The cell contents of the alveoli are mixed with and suspended in a semi-fluid medium, consisting principally of modified mucin which seldom contains albumen coagulable by heat, free albumen or septon, but occasionally traces of albuminate of soda. It is a thick, creamy fluid of greenish-white colour, not unlike the sputa in chronic bronchitis. Its reaction is alkaline.

The floating elements are principally free nuclei and cells without special histological character.

a. The free transparent nuclei with delicate margins shrink when treated with acetic acid, and dissolve in alkalis. Some have one nucleolus, others two nucleoli (fig. 39).

Fig. 39. ×300



The nuclei are of different sizes; the large ones enclose a

considerable number of minute oil-globules, and very seldom contain nucleoli (fig. 40).

Fig. 40.
×300

They strongly resemble pyoid bodies, and may be distinguished from atrophied shrivelled cells by not swelling in acetic acid. They shrivel and their margins become distinct, but not irregular (serrated or kidney-shaped) as those of healthy cells do. They refract light more powerfully, and dissolve more readily in diluted alkalis than atrophied shrivelled cells (figs. 41 and 42).

Fig. 41.

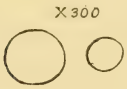
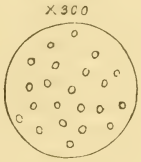


Fig. 42.
×300

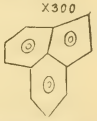


They may be considered as products of a retrograde metamorphosis, and transitions to colloid corpuscles.

Fig. 43.
×300

β. The cells are of different sizes, and contain one nucleus, or several nuclei. They are globular, and closely resemble *mucus* or *pus cells* (fig. 43), but their surface is less granular or uneven, being expanded or smoothed by the swelling out of the cell-membrane. This swelling accounts for the considerable size which such cells sometimes attain. A few cells resemble the polygonal epithelial cells of the cyst-walls (fig. 44).

Fig. 44.
×300



In the finely-granulated protoblastema of these cells occasionally a globular, homogeneous, transparent body, with delicate but sharp outlines, may be noticed (fig. 45).

Fig. 45.
×300

Fig. 46.

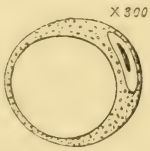


Fig. 47.

These transparent bodies are of varying size, and sometimes

fill up the whole cell (figs. 46, 47), having the nucleus between them and the cell-wall.

Acetic acid, which completely dissolves the cell-membrane and contents of ordinary cells, has no effect on these transparent bodies, which, with the nucleus, remain unaltered like colloid-globules. They are probably drops of a mucous substance, generated within the cell, which grow at its expense, destroy the endosmotic properties, and thereby cause death.

Fig. 48.

The final products of this retrograde metamorphosis are identical with those of the transformed nuclei described above (fig. 48).

Fig. 49.

Sometimes the mucous metamorphosis of the cell will commence with the nucleus itself, which will become transmuted into a colloid-globule within the cell. In such cases, the nucleolus will remain visible a long time within the colloid-globule (fig. 49).

Generally, however, it will disappear at an earlier period (figs. 50, 51).

Fig. 50.

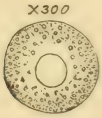


Fig. 51.

Fig. 52.

Sometimes a mucous substance will form around the apparently unaltered nucleus, and usurp the place of the other cell-contents (fig. 52).

Such is the origin of isolated nucleated colloid-globules.

Fig. 53.

Fig. 54.

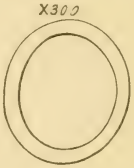


Fig. 55.

Colloid-globules may also be observed, which enclose a secondary lesser colloid-globule (figs. 53 and 54).

Besides the already described varieties of colloid-globules,

there are large transparent *mucous globules*, which contain a considerable number of nuclei aggregated in lumps or groups (fig. 55).

Like other colloid-globules, they are devoid of a visible external pellicle. They appear to be secondary accidental formations enclosing several nuclei, which originated in the segmentation of one larger nucleus.

Micro-Chemical Examination of, and the Effect of Re-Agents on, the Histological Elements found in Ovarian Fluids.

a. *Water.*—The majority of the above-described histological elements are not visibly altered by the addition of water. The largest colloid-globules shrink and diminish in bulk: but are not otherwise affected. The other cells have their margins rendered more distinct, dilution of the fluids diminishing their refracting power, whilst that of the cells remains unimpaired. Amorphous flakes of precipitated mucin will appear among the cells.

b. *Alcohol* produces coagulation of the albuminous substances. They become granular and thready, entangle and surround the histological elements like a network, and contract into clots. The larger colloid-globules shrink in proportion more than the smaller ones. At the same time they refract light more powerfully, and their margins appear more defined. The large colloid-globules, which contain one or several groups of granules, assume an irregular shape, and their margins closely adapt themselves to the granular aggregation. This is due to the great affinity of alcohol for the water within the globules. The free aggregations of granules and the elements which have been compared to pyoid bodies remained unaffected.

c. *Ether.*—The action of ether is similar to that of alcohol, but weaker. It will not immediately dissolve the fatty granules within the cells, nor the larger oil-globules in the fluids. If a drop of a colloid-fluid is evaporated to dryness on a glass-slide, and the residue repeatedly treated with ether, a small quantity of fat will be extracted, which, after the evaporation of the ether, will collect in minute globules around the dried colloid. If this residue of the colloid fluid is again moistened with water, the histological elements will swell and

resume their former character. The addition of water will restore the elements to their former condition, even after long boiling in ether. Only a minute quantity of fat can be extracted from the cells and other matters after the long action of ether. Continued boiling in alcohol has a similar unsatisfactory result.

d. *Concentrated acetic acid.*—A drop of a colloid-fluid on a glass-slide treated with concentrated acetic acid will form a solid mass, which consists of threads of mucin entangled with the cell structures. The acid has no dissolving power on the elements; on the contrary, it makes them shrivel. The colloid-globules contract more than the other elements. From condensation they receive a peculiar dull lustre, and their margins become more defined. The horn-cells and the pyoid bodies swell from the continued action of acetic acid. The former become globular and lose their wrinkled appearance.

e. *Diluted nitric acid* coagulates the amorphous protein-substances in the ovarian fluids. It communicates to the cell elements a straw-yellow colour, which changes into bright-brown on the addition of liquor potassæ (Xantho-protein test). It is difficult to distinguish whether the granules themselves, or only the intermediate substance which binds them together, have been coloured. When this substance forms a transparent zone around the granules, it becomes coloured. The large, free fat-globules remain colourless. Colloid-globules turn pale-yellow and contract slightly, but with a greater quantity of acid, they swell again and even dissolve, especially after the addition of some liquor potassæ.

f. *Concentrated nitric acid* acts at first like the diluted acid; but afterwards only a dark-yellow fluid is left. Heat will assist the rapidity of this process. Colloid-globules dissolve quicker than the granular aggregations. In the latter the granules at first become free, then form into a large drop, and are destroyed. All the histological elements, with the exception of the horn-cells which merely turn brown and swell, will turn into a yellow, transparent fluid, from which liquor potassæ precipitates an amorphous substance in whitish flakes.

g. *Concentrated sulphuric acid* has the same effect, but colours the elements brown before dissolving them.

h. *Concentrated hydrochloric acid* is much weaker in its

action. But with heat the majority of the elements will be dissolved. They, however, never turn of clear violet colour, as albuminous substances do. They turn a dirty red-brown before dissolving.

i. *Millon's re-agent.*—The very acid liquid which is obtained by dissolving mercury in its own weight of nitric acid with 4·5 equivalents of water, is an extremely delicate re-agent for all albuminous substances, and for a large number of the secondary products related to them. It communicates a *deep-red colour*; and minute quantities of albumen in water may be readily detected. This test acts in low temperatures like nitric acid, but when heated it colours the elements *brownish-red.*

j. *Tincture of iodine* communicates a *rich brown* colour to the elements, but they never assume the peculiar tinge characteristic of the amyloid substances. Iodine in a saturated solution of chloride of zinc fails in producing that colour.

k. *Protoxide of potassium or potash*, even in much diluted solutions, powerfully affects the elements. The larger colloid-globules rapidly swell and dissolve; the smaller colloid-globules resist its action longer. The granular aggregations are more slowly acted upon; some swell, and appear to be surrounded by a clear transparent zone; others will not be visibly altered. Moderately concentrated liquor potassæ, however, affects them powerfully and quickly; the binding substance swells; and the elements are changed into striated or uneven bodies, within which the granules are no longer seen. After some time these elements split into needle-shaped fragments, which float in the fluid and dissolve. Of the granules only a few remain, which run together, and are no further affected by liquor potassæ. The smaller colloid-globules occasionally break up into needle-shaped fragments before dissolving—a phenomenon which Rokitansky describes. The small transparent bodies, which resemble *pyoid bodies*, resist the action of diluted liquor potassæ much longer than the colloid-globules; but in concentrated liquor potassæ they swell, dissolve, and leave only a few fat-globules as residue. The *horn-cells* will not dissolve even in the strongest liquor potassæ; they swell to globular masses of rich brown colour, without showing a nucleus. Sometimes they break up into membranous shreds.

1. The fat, which enters into the composition of most of these elements, is not easily soluble in concentrated liquor potassæ, and will remain in the form of minute scattered fat-globules after their dissolution. The following experiment will prove the indestructibility of fat. A portion of the sediment, precipitated from colloid-fluids diluted with water, is shaken with moderately diluted liquor potassæ in a test-tube. On the following day this mixture will be found to have changed into a clear brown liquid with a minute quantity of dark brown sediment, and a whitish pellicle floating on the surface. The sediment consists of swelled, brown horn-cells, and a great quantity of cholesterine crystals; the pellicle on the surface is formed by a greasy substance composed of fat-globules, and crystalline needles of olein and palmatin. Both are readily dissolved in ether when heated. A quantity of the solution evaporated on a glass-slide leaves behind fat-globules, in which, on cooling, radiated groups of crystalline needles will form.

The following conclusions may be made from the above micro-chemical statements:

a. Chemical examination has proved those highly refracting granules which occur in all ovarian fluids to be *fat-globules* or *fatty granules*. The difficulty of extracting fat-globules from the other elements with ether, depends on their being surrounded by very dense matter. It is only after dissolving this in alkalis that the fats can be recognised. It is a well-known fact, that fat, as it occurs in histological elements undergoing fatty degeneration, will not readily dissolve in alkalis.

b. The other microscopical elements behave like protein-substances, when treated with mineral acids, Millon's re-agent, tincture of iodine and alcohol; but they cannot be ranged with the genuine albuminous substances. Excluding the horn-cells, which show the insolubility in the alkalis and acids characteristic of keratin, they are related either with the substances of albumen or the mucin group.

c. The principal components of the colloid-globules and of the granulated aggregations range with the substances of the mucin group. Their mucous character, especially that of the colloid-globules, can be proved in a micro-chemical way. If the peculiar sediment which gradually forms in colloid fluid, when diluted with water, is shaken in a test-tube with diluted

liquor potassæ, the colloid-globules and the amorphous mucin dissolve. This solution behaves exactly like an alkaline solution of mucin, but will not give the characteristic reactions of albumen. The substance of the colloid-globules answers to all the tests for mucin and forms voluminous precipitates. The granular aggregations and the pyoid bodies will not dissolve when treated with dilute liquor potassæ. From that precipitate, when treated with strong liquor potassæ, every component will be dissolved except the fat, which appears as a film on the surface, and the horn-cells, and the cholesterine which form an inconsiderable sediment. The solution so obtained will be alkaline and of reddish-brown colour, and will behave in every respect like a solution of mucin ; but will besides show traces of an albuminous substance. Thus acetic acid will produce a dirty gray precipitate, insoluble in an excess of acid. From the supernatant acid fluid, ferro-cyanide of potassium will cause another precipitate in flakes. Hydrochloric acid gives a very copious precipitate, the greater portion of which will re-dissolve in an excess of acid ; but from the supernatant acid fluid there will be no further precipitation produced by ferro-cyanide of potassium. From the chemical behaviour of the granular aggregations, which visibly contract and shrink in acetic acid, but readily dissolve in mineral acids, we must draw the conclusion that the mucin-like substance in strong alkaline solutions depends on the presence of these granules. The sediment of a diluted colloid-fluid may be boiled repeatedly in concentrated acetic acid without dissolving the colloid-globules or granular aggregations: they merely shrink more than when treated with cold acetic acid. That colloid-globules after having been boiled for hours in concentrated acetic acid will partially dissolve into a liquid, in which ferro-cyanide of potassium produces another precipitation, furnishes no proof of the presence of some albuminous substance, because mucin is decomposed, when treated in like manner, and yields an albuminous substance. The mucin character of colloid-globules is further expressed by their viscidity, and shrinking in water. The size of the globules is in inverse proportion to their firmness ; the larger ones having apparently originated from the swelling of the lesser globules.

d. The *small transparent bodies*, which have been compared

with the pyoid bodies, are the only elements in ovarian fluids which appear to be composed of a somewhat insoluble albuminate. They are insoluble in weak liquor potassæ, but dissolve in it when concentrated; they swell in concentrated acetic acid, and dissolve when boiled. The traces of albumen, which are obtained from solutions of the elements in strong liquor potassæ, depend on the presence of these bodies.

CHAPTER VI.

DIAGNOSIS OF OVARIAN TUMOURS.

THERE have been dark ages in all histories, and if we follow the thread of the story of ovarian disease it will lead us back into the profoundest obscurity. Did such things as wreck-charts of medical science exist, we should find all the old tracks of this region of pathology very blackly spotted. They would be marked dangerous, fatal, and no one ventured through them. Surgeons stood and trembled on the brink of ovarian waters. The trocar was for a long time the only palliative measure they dare use, and tombstones recorded marvels of endurance at their hands. Even William Hunter could only write of ovarian dropsy as 'so desperate,' and John Bell is said to have dwelt with peculiar force and pathos upon the organic diseases of the ovaries, speaking of their hopeless character when left to themselves. But this was a state of things which could not last. In Hunter's time, as he says, 'modern surgeons, deservedly of the first reputation, have proposed to attempt a radical cure by excision of the cyst.' Then came the arresting question, 'Could we know beforehand that the circumstances would admit of such treatment?' The difficulty was in the diagnosis. There was a thick surgical darkness over the abdomen, and it gave out only uncertain sounds. No eye then peered into exploratory incisions, and auscultation was not a science. Whatever was to be done must be done at a venture, and, leaning on his gold-headed cane, the physician could only nod his doubting acquiescence, and mutter to himself behind his bouquet, 'Surely, in a case otherwise so desperate, it might be advisable to do it.'

Coming down to our experience of the desponding hopelessness of even contemporary writers, we find Dr. West, one of the

ablest and most logical of the early opponents of ovariotomy, thus pathetically lamenting the inefficiency of surgical art for the relief of the victims of ovarian disease. In one of the editions of his Lectures on the Diseases of Women, he says, after describing the painful course of the early stages of the disease, that as the end approaches we have 'symptoms of the same kind as we see towards the close of every lingering disease, betokening the gradual failure, first of one power, then of another; the flickering of the taper, which, as all can see, must soon go out. The appetite becomes more and more capricious, and at last no ingenuity of culinary skill can tempt it, while digestion fails even more rapidly, and the wasting body tells but too plainly how the little food nourishes still less and less. The pulse grows feebler, and the strength diminishes every day, and one by one each customary exertion is abandoned. At first the efforts made for the sake of the change which the sick so crave for are given up; then those for cleanliness; and lastly, those for comfort—till at length one position is maintained all day long in spite of the cracking of the tender skin, it sufficing for the patient if in that respiration can go on quietly, and she can suffer undisturbed. Weariness drives away sleep, or sleep brings no refreshing. The mind alone, amid the general decay, remains undisturbed; but it is not cheered by those illusory hopes which gild, though with a false brightness, the decline of the consumptive; for step by step death is felt to be advancing; the patient watches his approach as keenly as we, often with acuter perception of his nearness. We come to the sick chamber day by day to be idle spectators of a sad ceremony, and leave it humbled by the consciousness of the narrow limits which circumscribe the resources of our art.'

This picture drawn by Dr. West is true. We have all seen the poor creatures he so eloquently describes fading hopelessly away. But the resources of our art are not so limited as he would imply. We may be something more than idle spectators of a death-bed. We have a resource to offer—hazardous it is true—but one which has in many cases been crowned by a complete and brilliant success.

Fifteen years ago I stood at one of these death-beds, in consultation with one of our highest authorities on ovarian disease.

He was half convinced by my arguments in favour of an operation, but he felt his responsibility deeply, and said, 'How dare I advise an operation we both know to be so dangerous?' I replied, 'How dare you leave the poor woman to die without an effort to save her?'

Much later than the prophetic and wistful times of Hunter and Bell, Lizars of Edinburgh was the first to attempt the operation in this country, following the lead of an American pupil of John Bell—McDowell, the 'Father of Ovariotomy.' In 1823 Lizars laid open the abdomen of a woman, twenty-nine years of age, who was supposed by several eminent physicians to suffer from ovarian disease. But it was proved that the abdominal enlargement was due only to tympanites and obesity. Lizars published a full account of this case, and I have received information respecting it from two gentlemen who were present—the late Dr. Knox, and Dr. Boulton of Horncastle. The chief interest of the case rests in the illustration it affords of the ignorance of physical diagnosis fifty years ago. Two years afterwards Lizars fell into a similar error, and opened an abdomen only to find a large uterine tumour. Mistakes nearly identical have been repeatedly made in London practice; and Boinet cites from the 'Gazette Médicale de Paris' for 1840, p. 347, a case published under the title 'Histoire d'une hydropisie de l'ovaire, prise pour une grossesse normale, une grossesse extra-utérine, un amas de matière fécale, et diverses autres tumeurs.' The details of the case and the particulars of the consultation are all given. The patient was a girl of sixteen, admitted into the Hôtel Dieu, Sept. 16, 1836, for retention of urine, with considerable enlargement of the abdomen. She began to menstruate when twelve and a-half years old, but two years and a-half afterwards the menses were suddenly suppressed by some violent emotion. In a very short time the belly began to swell, with deep-seated pain in the left side, made worse by pressure. The increase of size was very rapid, and soon equalled that of pregnancy; but no loss of health followed, and the only inconvenience was that of retention of urine, making either a bath or the catheter necessary twice a day. The abdomen was so uniformly distended that it had the exact appearance of preg-

nancy. Above the navel and on the right side resonance was perfect, but the left side gave a dull sound, and was elastic under pressure, without fluctuation. The breasts were not altered, of natural size, form, and colour. The hymen had been destroyed by examinations, but the appearance of the vagina corroborated her statement that she had never had sexual intercourse. The neck of the uterus was long and slender. There was no ballottement, and its size and position were quite natural. Nothing could be learnt by the rectum, and a sound passed into the bladder without encountering anything. The gait was that of a pregnant woman, with the body thrown backwards. Not quite sure of the nature of the disease, but believing it to be an ovarian cyst, M. Blandin asked the advice of his colleagues. The first thought it to be a case of pregnancy, but would not pronounce positively, as he was puzzled by the assertions of the patient. Another declared it to be pregnancy, but extra-uterine, and explained the clear sound on the right side by affirming that the child was dead and decomposed, and that there was an accumulation of gas. A third refused an opinion, but was inclined to guess that there might be a mass of fæces impacted in the left iliac fossa. Number four, finding himself unconvinced by the reasonings supporting the opinions of his confrères, declined to commit himself to anything. The fifth, after passing a sound into the uterus, came to the conclusion that there must be either a tumour of the peritoneum, or an effusion of blood into it. Notwithstanding all this, some others of the surgeons would persist in believing that there was a collection of blood pent up in the uterus. 'En résumé, tous les consultants, après plusieurs examens, restent dans la doute, même Blandin, quoiqu'il admette, à cause de la matité que l'on rencontre dans le côté gauche, l'existence d'un kyste ovarique.' The girl remained in the hospital for more than twelve months, keeping up her plumpness and good looks, with the abdomen unchanged in size, and always giving a sensation of fluctuation to herself when she moved, and to Blandin when he examined with 'un mouvement de succussion brusque.' Fortunately, as no one knew exactly what to do, nothing was done, and the patient found safety at least in the multitude of her counsellors. She escaped treatment, went out of the hospital,

changed her doctors for a husband, and was cured by the spontaneous and gradual discharge of all the fluid she had so long carried by the uterus and vagina. The menses returned, the bladder recovered its power, the tumour disappeared, and though she never had any children, yet twenty years afterwards she was alive and well. Now the question has been asked, was there really anything to justify all these different opinions, or was it impossible to form a correct diagnosis on the case? No doubt every man who had an opinion could advance some reason in favour of it; but a diagnosis is not made by holding positively to the indications of a single symptom. The case was not a very urgent one, and the repeated balancing of light probabilities seems to have perplexed some of the consultants. Blandin was right but hesitating, and could not gather up all the threads of his reasoning into a tight knot of assurance. The interlacing of contradictory opinions, and the tangling of evidence as it was over and over again brought to bear upon each, were undeniably enough to make stagger even men as Hunter says 'deservedly of the first reputation,' but whose knowledge was only the knowledge of their day. And the pathology of ovarian disease, at that date, was not very exact. But now, when so much investigation has been made and so much experience has been gained, one sees on the first glance at the narrative what was the nature of the disease, and can fairly estimate the sources of the professional bewilderment in the face of enigmas then unsolved.

Since that occurrence, rendered to us almost ludicrous by its happy dramatic ending, a new generation of pathologists and surgeons has had time to do its work. Men of every civilised country have contributed their share of information, in the shape of hypothesis and demonstration, analysis and experiment, blunders and success, as to the anatomy and physiology of the ovary, the nature of its diseases, and the way in which they are to be dealt with. If all be not yet disclosed, if practice be not made perfect, and we still remain at fault on some points of detail, the questions of diagnosis of ovarian tumours are at any rate so far advanced, as to render that which was formerly obscure almost a matter of instinctive perception, and to make signs which once only led to hesitation now the indications to confident action. Fortunately, diseased changes are

always repeating themselves, and that which tormented the wits of our predecessors shows itself again to us. We have but to wait our turn, and the chance of solving the problem is sure to recur to us again as the vicious circle is completed. Now as ever, when a woman with enlarged abdomen comes under medical examination, the three inevitable questions rise up for determination :—1st. Has she an ovarian tumour, or is it something else which can give rise to the same symptoms and appearances? 2nd. If she has an ovarian tumour, of what kind is it, and how can we distinguish one kind from another? and 3rdly. Are there any other abdominal conditions and diseases of enlargement coexisting with it and disguising its identity, modifying its progress, or influencing our views as to its treatment?

The first point therefore which has to be considered in studying a case of abdominal swelling, is the cause from which it arises. The presumption being on the side of an ovarian tumour from the existence of a certain set of signs and symptoms, the probability of its being simulated by some other disease has to be discussed. And there are many conditions, some morbid, others natural, which may give rise to doubt and difficulty in coming to a decision; though these diagnostic puzzles vary much in force according to their nature, the conditions under which they offer themselves, and the amount of experience and tact in the investigator.

After the following enumeration of the principal states and diseases which may throw doubt on the diagnosis of a case of ovarian tumour, or for which it may be mistaken, I shall proceed to the separate consideration of the most important. In connection with the peritoneum we have—

Ascites,
Cancer and tubercle and encysted dropsy of the peritoneum,
Tympanites and phantom tumours,
Fibro-plastic tumours of peritoneum, and
Fatty tumours of omentum and mesentery.

Difficulties in diagnosis caused by uterine enlargements arise from—

Pregnancy,
Retained menses and moles,

Air and fluids in uterus,
Fibroid tumours,
Cancer.

Another miscellaneous group is this—

Enlargements of other viscera, such as the liver, spleen, and lumbar and mesenteric glands,
Hydatid cysts of the liver and peritoneum,
Moveable kidney and cysts of the kidney,
Fæcal accumulations,
Distended bladder,
Hæmatocele,
Pelvic abscess,
Extra-uterine pregnancy,
Enchondroma, or encephaloid disease of ilium or vertebræ.

But it may first of all be asked how far we are able to discover the ovary itself, either in its natural condition, or slightly increased in size by its ordinary function or by an access of inflammation.

Dr. Schultze, in a paper which may be found in the library of the Obstetrical Society, on 'Palpation of Normal Ovaries and on the Diagnosis of Slight Enlargements of them,' refers to the conflicting opinions of Scanzoni and Veit. Scanzoni says, when treating on Oophoritis, that, unless the inflammation has led to considerable exudation, it is not easy either through the abdomen or the vagina to detect any palpable swelling. Veit says that a swollen and painful ovary can only be detected when the abdominal wall is very lax, and rectum and vagina both very wide. Under these circumstances it is often possible, by combining external and internal examination, to completely circumscribe the ovary.

Schultze, endeavouring to establish an accurate diagnosis between cases of acute and chronic oophoritis and other cases of peritoneal exudation accompanying different varieties of chronic perimetritis, convinced himself that normal ovaries may be felt in their normal situation on either side of the uterus, a little below the brim of the pelvis, between one finger passed upwards in the vagina and another passed downwards from the abdominal wall. It is only in some exceptional

cases of firm vagina or very tense abdominal wall that the ovaries cannot be felt.

In order to carry out this examination effectually the patient must be on her back, with the shoulders and knees raised to relax the abdominal parietes, and both bladder and rectum must be empty. It is only by combined internal and external examination that a normal ovary, or one only slightly enlarged, can be detected. External examination alone is quite fruitless. By vaginal examination alone, a resisting body may perhaps be felt through the upper part of the vault of the vagina; perhaps its mobility may be recognised, but nothing more. Indeed, in most cases the ovaries are so easily moved that they cannot be felt by internal examination alone. Yet two fingers brought together, one from without and one from within, may fix and feel the ovary between them. It is well first to feel the fundus uteri, and to steady it by one or two fingers, and then by the combined examination the ovary is felt near the uterus, on one side of it. The finger can be passed around it, and it may be moved easily from before backwards, and less easily towards and away from the sides of the uterus. It has a firm, elastic feel, glides easily under the fingers, and the unevenness of the surface may often be clearly detected.

A small hard mass of fæces in the bowel—a cyst in the broad ligament—a dilatation of a Fallopian tube—or a small pedunculate fibroid outgrowth from the uterus—might give a similar impression to the examining fingers, but after some practice the characteristic feel of the ovary may generally be recognised.

The right ovary is most readily detected by one or two fingers of the right hand in the vagina, the left hand being on the abdomen—the left ovary, by the left hand being used for the vagina, and the right for the external examination.

Schultze thinks that examination by the rectum is never so useful as by the vagina. In most cases when the ovaries can be readily felt by the vagina, they cannot be reached by the rectum. Even in the case where the ovary is abnormally situated in Douglas's space, it is easily felt through the posterior wall of the vagina, and the fingers of the hand examining by the abdomen reach a finger in the vagina much more

readily than one in the rectum. Examination both by rectum and vagina is necessary when an ovary not enlarged is supposed to be in Douglas's space, for Schultze has known an enlarged gland *behind* the rectum to be felt through the vagina and mistaken for an ovary.

It must be remembered, in judging of the size of an ovary, that a small ovary felt through a thick abdominal wall will appear to be larger than it is, and that ovaries of the same size felt through walls of different thickness may appear to be of different sizes. A little practice will be sufficient to teach what allowance should be made for this source of possible error.

A healthy ovary is generally insensible to moderate pressure. But it may often be sensitive to pressure when there is no reason to suspect any inflammation, or any other departure from a state of health. Even ovaries considerably enlarged by inflammation are often insensible to considerable pressure—a proof that oophoritis need not necessarily implicate the peritoneum; for when this membrane becomes implicated there is generally extreme sensibility to pressure.

Schultze says he has often observed that an inflamed ovary has been found in Douglas's space—less often in front of the uterus to the side—and that after it has recovered its normal volume and sensibility, it has also returned to its normal position. In other cases after recovery it maintains its abnormal position, and in one case an ovary which had been closely adherent to the uterus after inflammation was several months before it became again moveable. So many of the symptoms supposed to indicate an oophoritis may really depend on some form of metritis or pelvi-peritonitis, or some flexion or other change in the uterus, that we may agree with Veit in his opinion that the diagnosis of oophoritis can only be made out with certainty, when the swollen and painful ovary can be distinctly felt as a circumscribed swelling. It is not necessary that it should be moveable; although it may be excessively difficult to recognise an ovary when fixed by adhesions.

Diagnosis between Ovarian Dropsy and Ascites.

Ascites.—Our senses of sight, touch, and hearing are all required to assist us in distinguishing ascites from ovarian

dropsy, the physical diagnosis being established—1, by inspection and measurement; 2, by palpation; and 3, by percussion and auscultation.

I.—On *inspection*, the *size* of the abdomen is seen to be increased both in ascites and in ovarian dropsy; and, when an ovarian cyst is large, the abdominal enlargement is general, as it is in ascites. But while the cyst is of moderate size, the abdominal enlargement is often partial, more to one side than the other, more below the umbilicus than above. In *form*, the flanks and sides of the abdomen protrude in ascites, the front not being more convex than in the natural state, or it may be flattened: while in ovarian disease the bulging is generally most evident in front, less so at the sides, and often more on one side than the other. When the different portions of a multilocular cyst can be seen, of course all doubt is dispelled, but these remarks apply to simple cysts only. Alterations in position generally produce a greater and more immediate change in the form of the abdomen in ascites than in ovarian disease, the free fluid gravitating much more readily than a cyst can move. The normal depression of the *umbilicus* is altered whenever the general abdominal enlargement is considerable both in ascites and ovarian dropsy; but in the latter disease, although it may be flattened as in pregnancy, it is never prominent and bulging as it very often is in ascites, or when ascitic fluid surrounds an ovarian tumour. The *superficial veins* may be enlarged from the lower part of the abdomen to the chest, on one or both sides, in either disease. This appearance only assists in diagnosis when the enlargement is much more evident on one side than the other. Such undue importance has been given to enlargement of the superficial abdominal veins as a distinction between ascites and ovarian dropsy, and between simple and malignant tumours within the abdomen, that the following facts should be recollected:—

Congestion of the epigastric veins, when seen merely as a fine network of capillary veins, is usually a simple result of absorption of the cutaneous fat, the vessels becoming visible through the thinned and distended skin, and of no diagnostic value. When some of the larger veins, distended or varicose, are seen to run from the inguinal region upwards, and either cease abruptly in the middle of the abdomen, or run to the

hypochondriac region, or even up to the clavicles, anastomosing with branches of the mammary and intercostal veins, the impediment to the circulation may be of several kinds.

It will be remembered that the epigastric veins are part of the system of the inferior cava. They are usually very small. They begin in the subcutaneous cellular tissue by small radicles, which unite on each side of the body to form two branches – one, small and internal, runs on each side of the middle line—one, larger and external, can be traced upwards to the side of the thorax and to the axillary vein. These two branches unite on each side close to Poupart's ligament, and open into the internal saphenous vein at the spot where this vein and the femoral vein unite. The superficial fascia lies between these veins and the recti muscles.

The causes of stagnation or retardation of blood in the epigastric veins are—

1. In the *heart* itself, impeding the return of blood from the cava.

2. In the *trunk* of the inferior cava—(*a*) tumours pressing the vein towards the vertebral column; (*b*) coagula within the vein; (*c*) extension of cancer to the vein. The varicosity of the veins of the lower extremity is often prevented by a free collateral circulation being set up by dilatation of the vena azygos.

3. In the larger *branches* of the inferior cava—(*a*) pressure of tumours; Cruveilhier has seen both iliacs obliterated by the pressure of an ovarian tumour, and the epigastric veins dilated to the thickness of a goose-quill running to the axillæ. (*b*) coagula; (*c*) pregnancy.

4. In the *Portal System*. As the hæmorrhoidal branches of the inferior mesenteric vein (one of the veins forming the portal system) unite in the hæmorrhoidal plexus with the hæmorrhoidal veins which run into the internal iliac vein, there is a free communication between the portal and general venous systems. By throwing injections either into the vena porta or the pelvic veins, Cruveilhier has proved that the pelvic, hæmorrhoidal, internal pudic, obturator, and gluteal veins anastomose very freely. So that mesenteric and other tumours, which may, perhaps, not cause direct pressure on the cava, may lead to dilatation of the epigastric veins secondarily, by

their effect on the vena porta or its branches, just as any disease of the liver which leads to impeded portal circulation may have the same effect.

When the integuments are œdematous, the lineæ albicantes become more prominent than the neighbouring portions of skin, and have a knotty appearance which has led to the mistaken appellation of *varicose lymphatics*. Nearly all the cases in which I have observed this appearance have been cases of tumour surrounded by ascitic fluid. The *movement* on respiration is defective, both as regards the soft wall of the abdomen and the lower ribs; while the respiratory movements of the upper ribs are exaggerated in both diseases. The alteration in movement only assists in diagnosis when it is partial or affects only one side. On making deep inspirations the upper part of an ovarian cyst may often be seen to rise and fall. This appearance is very characteristic. In ascites it may be simulated by some distended coils of intestine moving with the diaphragm; but the resonance of the intestine on percussion instantly settles all doubt on this point.

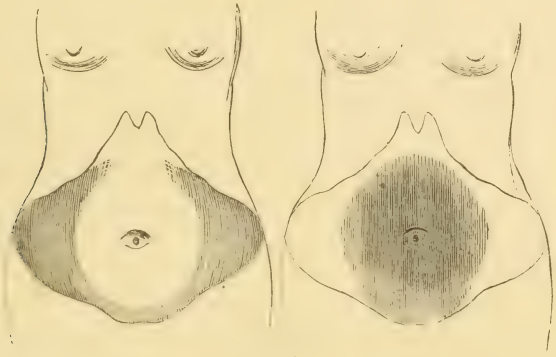
On *measurement*, the enlargement of the abdomen in ordinary ascites is equal on both sides, or symmetrical; and, although the distance from the sternum to the pubes is increased, the umbilicus retains its normal position—about an inch nearer to the pubes than to the sternum—and is about on a level with the highest point of the crest of the ilium on each side, and midway between these two points. In ovarian dropsy there is often a considerable alteration in the measurements between the umbilicus and sternum, and umbilicus and pubes, as well as between the umbilicus and the two cristæ ilii. In ascites the greatest circular measurement is at the level of the umbilicus; in ovarian dropsy it is often some inches below that level.

II. On *palpation*, the abdominal wall is felt to be harder and more resistant than natural in both diseases in the parts where much fluid is present, but is soft and elastic in other parts. Consequently the variation in the seat of hardness with the position of the patient becomes useful in diagnosis, the fluid in ascites gravitating freely to the most dependent part. *Fluctuation* is perceived with varying distinctness according to the degree of tension of the abdominal wall, to

the thickness of the layer of fat, to the amount of œdema, to the thickness of the peritoneum or of the cyst, to the quantity and character of the fluid, and to the amount of tympanitic distension of the intestines. In itself, it offers no assistance in diagnosis, because a thin-walled ovarian cyst, filled with limpid fluid, with a moderately tense and thin abdominal wall, would give a more quick and decided wave than a moderate quantity of ascitic fluid beneath an abdominal wall thickened by fat or subcutaneous œdema. The characteristic peculiarity of the fluctuation in ascites is that it varies with the position of the patient, and is only perceived in the parts where the fluid gravitates towards the abdominal wall; while in ovarian dropsy its situation does not vary with position, but is perceived wherever fluid is to be discovered by

III. *Percussion.*

The two following diagrams represent the situation of clear and dull sounds obtained by percussion in typical cases of ascites and ovarian disease, the patient lying flat and evenly on her back. The dark parts of the abdomen are dull, the rest clear. In ascites, the stomach and intestines are above



and in front; the fluid behind and on either side. In ovarian dropsy the fluid is in front, extending in different degrees to either side, and pushing the stomach and intestines upwards and backwards, just as a gravid uterus does. The figure to the right of the page, indeed, would represent either a gravid uterus near the full period of pregnancy, or an ovarian cyst of about the size of such a uterus, and situated centrally, as

ovarian cysts often are at this, or a rather later, period of their growth. But quite as frequently they tend towards one side or the other, in such cases the diagnosis being, of course, easier.

It is seldom that a patient with ascites lies so flat as not to raise the shoulders enough to throw a layer of fluid downwards towards the pubes. Very often the dulness may extend as high as the umbilicus, and generally does so when the shoulders are much raised by pillows. This might lead a superficial observer to suppose that the disease was ovarian, because there was a dull sound in the front of the abdomen; but on lowering the shoulders and placing a pillow or hassock under the hips, the fluid at once gravitates towards the diaphragm, the intestines float to the surface, and a clear sound is obtained where it was dull before. No such alteration in the situation of dulness can possibly occur in ovarian disease. So on turning from side to side, the fluid gravitates to the side which is low, and the intestines rise to the upper side, with corresponding changes in the situation of dull and clear sounds on percussion. No such alteration can occur in ovarian disease. Again, at any spot near the level where the resonance of the intestines ends, and the dulness of the fluid begins, and a dull sound is elicited by *gentle* pressure and percussion, a *deeper* pressure will displace the fluid, and the resonance of the intestines will be again heard. At the most depending spots the amount of pressure necessary to obtain a clear sound is some guide to the estimation of the thickness of the layer of fluid. No such difference in the sounds from superficial and deep percussion can occur in ovarian disease.

When fluid is free in the peritoneal cavity the wave of fluctuation may be felt not only where the sound is dull on percussion, but also beyond the line of dulness, even where resonance may be tympanitic. The intestines float in the fluid, and the fluid may be thrown in waves among them. But when fluid is contained within a cyst, fluctuation cannot be detected beyond the boundaries of the cyst. Hence the outline of the cyst, traceable by dulness on percussion, and the line where fluctuation can be perceived must be the same. No fluctuation can be detected where there is resonance on percussion.

It has been supposed that percussion on the loins is a very sure guide in diagnosis—that when the patient is sitting up and one loin is clear and the other dull the disease is ovarian, but that when the sounds are the same on both sides it is ascites. One dull side is also supposed to be a proof that the ovary of that side is the one diseased. But there are so many exceptions to these rules that they are of no great value, except as corroborating or counterbalancing other physical signs.

Auscultation affords little information, but it shows the presence of the gurgling sounds of the intestines in the spots clear on percussion, and the absence of these sounds in the dull spots, except on deep pressure by the stethoscope. In both diseases the fluctuation wave of fluid may be heard as well as felt.

By applying these general rules in any ordinary case, a few seconds will enable the surgeon to clear up all doubt. But there are various conditions which may lead to the necessity for further examination. The fluid in the peritoneal cavity may be so large in quantity, that the front of the abdomen is pushed far beyond the reach of the intestines. They float as far as the mesentery will allow them, but cannot reach the surface of the abdominal wall. In this case percussion must give a dull note in front just as it does in ovarian dropsy. So when the intestines are fixed in the back part of the abdomen by adhesions, or by a thickened omentum, the fluid is circumscribed in front as in ovarian dropsy.

Or an ovarian cyst may contain air, either from a perforating communication with intestine, or after tapping and decomposition of fluid; in this case percussion giving a clear note in front or above, and a dull note behind or below, as it does in ascites. In these cases physical diagnosis alone cannot solve the doubt, and we have to consider all that can be learned from the history of the case and the general condition of the patient. So, when fluid is free in the peritoneal cavity we must resort to tapping and chemical or microscopical investigation before we can decide whether the fluid is the ordinary non-inflammatory serum which transudes into the cavity in cases of heart, liver, or kidney disease, or the inflammatory exudation of chronic peritonitis in its simple or its tubercular

form, or whether it may be ovarian fluid which has escaped from a perforated or ruptured cyst.

After tapping, the question arises whether chemical and microscopical examination affords a certain means of recognising the nature of the fluid removed. Since Scherer's discovery of paralbumen, and the subsequent discovery that this derivative or altered form of albumen proper is a chief ingredient in ovarian fluids, it was at first believed that it would be a sure means of distinguishing these from all other fluids in abdominal swellings. But later experience has proved that this test alone is unreliable. So, on the other hand, the presence of fibrine in fluids was regarded as a proof of their having been effused from a serous membrane, not from the secreting membrane of an ovarian cyst. And if fluid contained both fibrine and paralbumen, the supposition was that an ovarian cyst had burst and there was a mixture of two fluids. If no fibrine could be detected in ovarian fluid taken from the peritoneal cavity, then it was supposed that, instead of preserving their own chemical characters after admixture, the fibrinogenous elements of the serous fluid were acted upon by the paralbumen in such a way as to interfere with the characteristic coagulation.

Dr. Schetelig, of Hamburg, who has diligently studied this subject, informs me that, in a case he watched at Breslau, the presence of fibrine in the fluid at the first tapping showed that it was purely ascitic — while, on the tapping being repeated, coagulation did not take place, and paralbumen was detected. This was accounted for by rupture of an ovarian cyst into the peritoneal cavity, a supposition which was subsequently proved to be correct at the time of ovariotomy.

The presence of paralbumen is certainly not a positive sign that fluid has come from an ovarian cyst. Dr. Schetelig found the contents of a very large renal cyst to consist mainly of paralbumen with cholesterine, and there was no trace of urea, the proper kidney structure having been completely annihilated.

Nor does the presence of fibrine prove that the fluid is not ovarian, for in a dermoid tumour which I removed in June, 1869, which contained bones and hair, Dr. Schetelig made out three distinct kinds of fluids in a number of isolated

cysts. In some there was an emulsion of fat and cholesterine; in others the albuminoid liquid so common in ovarian dropsy; and thirdly, in different parts of the large tumour, 'certain small isolated bags full of a limpid thin serum, which, being exposed to the atmosphere, soon coagulated like any other serous fluid overcharged with fibrine.'

While it is certain, therefore, that in cases of doubtful diagnosis complete reliance cannot be placed on the chemical characters of fluids removed from the abdomen, and that the rule of paralbumen being the characteristic of ovarian fluids, and fibrine of serous fluids, and the conjoint presence of paralbumen and fibrine pointing to a mixture of the two fluids, is open to many exceptions, it is still true that the rule is sufficiently often correct to become an aid of some value in arriving at a diagnosis, and to encourage us to attain more accurate knowledge by more extensive observation and more complete research.

And when free peritoneal fluid surrounds a tumour which can be felt either by deep pressure or after tapping, we have to determine whether this tumour is ovarian or uterine; or some form of intra-abdominal cancer or tubercle; or some hydatid tumour of peritoneum, omentum, or liver; or some tumour of liver, kidneys, or pancreas; or some retro-peritoneal tumour—aneurism, enlarged mesenteric or lumbar glands, enchondroma, cancer of vertebræ, or other condition which will be noticed in due order.

Cancer, tubercle, encysted dropsy, and changes produced by chronic inflammation of the peritoneum.—The fluid poured out as the result of inflammation of the peritoneum, instead of lying free in the cavity, is sometimes confined in pouches formed by adhesions among the viscera, or by quantities of false membrane deposited during the disease, or by expansions of the omentum or mesentery.

In his classical work 'On Diseases of Women,' Dr. West says, 'One instance of this latter occurrence has come under my own observation, in which between four and five quarts of a dark fluid were found collected between the folds of the omentum, and during the patient's lifetime frequent discharges of a similar fluid had taken place from the umbilicus. The dropsy had during the life of the patient been supposed to be

ovarian; but though malignant disease of both ovaries was discovered, yet neither of them contained fluid at all similar in character to that which was found in the omentum; nor, indeed, could either be detected till after the fluid in the omental cyst had been let out. I am aware of no means by which such cases are to be discriminated from ovarian dropsy; as far as I know, their nature has scarcely ever been suspected during the lifetime of the patient.'

The fluctuation, even if distinct, is always limited in extent, and confined to the same spots. The intestines are found behind or beside the tumour, and do not as in ascites rise up to the front of the abdomen, or vary with the position of the patient. The appearance of the belly is flatter than in cases of tense ovarian cysts, the distension is slower, the respiration is less impeded, and œdema of the extremities is seldom seen.

Sometimes, too, the small intestines and omentum may be all matted together, and the way in which one may be misled under such circumstances is seen by the following notes from my case-book.

February, 1870.—A lady aged forty-four, married for fourteen years, was sent to me by Dr. Lowe, of Lynn. She was cachectic, pale, and considerably emaciated, with very distinct fluctuation of the abdomen in all directions; the os uteri open, and the cervix large. By the vagina, what was supposed to be a cyst could be felt behind and above the uterus. The menstruation was usually regular, but she had lately been somewhat over the time, and had had some flooding. Four years ago had an early abortion, lost much blood, and was left very weak. Within the last two years there has been some increase of size, but not rapid until the last nine months, accompanied by occasional acute attacks of pain on the right side, the last a year ago. Diagnosis; ovarian cyst, chiefly one large cyst. Tapping was advised and done immediately. Seventeen pints of fluid were removed, a good deal also being left behind. On March 17 she was filling again, having had a catamenial discharge in February after the operation. The urine was free after the tapping, but was now again becoming scanty and thick. Fluid could be felt in the peritoneal cavity; the uterus was free, but the cyst could not now be found behind it. The operation for removal of the tumour was done on March

31. An incision of four inches was made between the umbilicus and symphysis pubis. The peritoneum was opened by a puncture, and much clear fluid evacuated. On enlarging the opening in the peritoneum enough to admit two fingers and see within, the whole of the fluid was found to be in the cavity. The uterus was roughened on its peritoneal surface, and both ovaries felt large, that on the left side as big as a walnut. Above and to the left was a mass feeling very like a multilocular ovarian cyst, evidently formed by adhering coils of intestine, thickened peritoneum and omentum. There was scarcely any bleeding, and the wound was closed with sutures. She had no bad symptoms after the operation; the wound healed well, and she went home on April 16. I was mistaken. I had noticed free fluid in the peritoneal cavity on March 17, and this ought to have led to more careful examination; but the uterine examination and the moving mass above the umbilicus deceived me.

Two very similar cases are recorded in the American journals: one in which Dr. McDowell, after considering the diagnosis as certain, opened the abdomen and found nothing but a mass of intestines conglomerated by adhesions; the other in whose abdomen the ovaries were discovered by Dr. Henry Smith to be sound, and the swelling due to thickened and indurated omentum.

But these localised collections of fluid in the peritoneum may be associated with cancer and tubercle of the membrane, and give rise to difficulties in the diagnosis, as in the case of an unmarried lady, aged twenty-two, whom I saw in consultation with Mr. Seymour Haden in 1862. The abdomen was as large as that of a woman near the full period of pregnancy, and was distended uniformly by fluid, which gravitated so decidedly to the lowest point with all changes of position, that it was evidently free in the peritoneal cavity; and looking to the appearance of the patient, and to the fact that she had occasional pain, I had little doubt as to the disease being a sub-acute form of tubercular peritonitis.

Mr. Haden, who six weeks before had tapped the patient, concurred in that opinion, and a tonic treatment with diuretics was commenced. For a time she improved, but during the autumn all the symptoms were aggravated, and I met Mr.

Haden again on November 3. A remarkable change was then found to have taken place. The abdomen was much more prominent or arched than before; it was dull anteriorly in all positions of the body, and clear in both flanks as she lay on her back. Moreover, on taking a deep inspiration, a cyst appeared to move downwards from the epigastrium beneath the parietes. Fluctuation was evident in all directions. This led me to doubt the accuracy of my first opinion, and it was arranged that she should be again tapped, partly to afford relief, and partly to clear up the diagnosis. She was tapped by Mr. Haden on November 12, and eighteen pints of clear amber-coloured fluid were removed, which deposited a cloud of flocculent mucoid substance, very much resembling that so often seen in ovarian cysts.

On November 19 Mr. Haden and I examined her again most carefully, with the express purpose of ascertaining whether we were dealing with tubercular peritonitis or with a thin non-adherent unilocular ovarian cyst. We both felt it impossible to arrive at a positive decision; but while Mr. Haden leaned to the belief in peritonitis, my own impression was rather the other way. In this state of uncertainty, and feeling that repeated tapping must be useless, it was arranged that a small incision should be made; and if a cyst was found it should be removed, whereas if there were no cyst, the incision would serve instead of tapping. Accordingly on December 24, 1862, Mr. Clover administered chloroform, and, assisted by Mr. Haden and Dr. Savage, I cautiously made a small incision below the umbilicus, and opened the peritoneum. No cyst appeared. A large quantity of opalescent fluid escaped, and then the whole of the peritoneum was seen to be studded with myriads of tubercles. Some coils of small intestine were floating, but the great mass was bound down with the colon and omentum, all nodulated by tubercle, towards the back and upper part of the abdomen. The uterus and ovaries were felt to be of the normal size, but their peritoneal coat was very rough. All the fluid was carefully pumped out by an india-rubber syringe, the wound was closed by sutures, and the patient treated precisely as after ovariotomy. She went through rather a sharp attack of peritonitis, but after two or three days suffered hardly more than after tapping. She passed large quanti-

ties of urine, and it seemed as if the use of the catheter excited this diuresis—so much so that Mr. Haden had it continued long after the wound was healed.

But the most remarkable part of the case remains to be told. The patient got well, married, and has been well ever since she recovered from the operation. Whether the peritonitis set up led to fresh adhesions or not, certain it is that no more fluid was secreted, and the patient regained health and strength. The case would serve as a striking appendix to Martin's curious paper 'On the Operative Treatment of Peritonitis.'

In a note which I received from Mr. Haden, dated November 1, 1864, he says, 'By a mere chance I happened to see her yesterday. I met her in the street. She was perfectly well.'

Mr. Haden wrote to me on April 15, 1872, saying, that this lady 'married in 1866. She has no children, but is stout, hearty, and well. Her age is now thirty, and her habits are active. The closure of the linea alba is not, and never was, complete, and she wears a bandage to keep herself together.'

Since I have learned to be more particular in bringing the peritoneal edges of the opening in the abdominal wall well together, I have seen fewer cases of this kind of ventral hernia than in my earlier cases.

The tumour from cancer of the peritoneum may become so large as to occupy a very great extent of the abdomen, but it is much more solid to the touch than the enlargement due to general tubercular disease of the same part. It is also sometimes accompanied, as in a case mentioned by Dr. Ballard, by an effusion of gelatinous matter into the sac, indicated during life by general and extreme filling up of the abdomen, to the eye and on measurement, with great elevation of the diaphragm as in ascites, dulness on percussion everywhere but at the epigastrium and along the margin of the ribs on the right side, and the most perfect fluctuation in every part. In fact, the symptoms produced by this condition of the peritoneum have been sometimes so closely like those met with in many cases of ovarian cysts as to deceive men of the greatest experience; and I have repeatedly been sent for under such circumstances expressly to discuss the question of ovariotomy, when the patient was not very far distant from the end of her career.

Even among my own cases the coexistence of cancer has been so masked by the symptoms of ovarian disease, that one has been led on by the hope of giving operative relief.

The housekeeper of a patient of Mr. Jones of Epsom, aged fifty-four, very corpulent, in October, 1868, had a tumour in the left side about the size of a cricket ball, which had been previously recognised as ovarian by Drs. Priestley and Farre. Three years before there had been some ulceration of the neck of the uterus, and a vascular growth at the orifice of the urethra. By the month of December, 1868, I found the whole abdomen filled by an elastic soft tumour, indistinctly fluctuating; the pulse rapid and feeble, bronchial murmur in the upper part of both lungs, pain down the left thigh, and within the last ten days falling off in the general health. I advised tonics and tapping, as her state was not then favourable for the operation of ovariotomy. She was accordingly tapped early in January, 1869, by Mr. Jones below the umbilicus, with the removal of eleven pints of bloody serum. On February 2, I found her in a much better state of health, but the tumour felt rather elastic than fluctuant; and though the cervix uteri was mobile, and there was no vascular murmur, doubts as to the uterine nature of the tumour arose in my mind, and I decided to begin the operation, which was urgently pressed by the friends and other medical attendants, by an exploratory incision.

On Feb. 18, this was accordingly done midway between the umbilicus and symphysis pubis to the extent of four inches, and the peritoneum exposed. It was so thick that I doubted whether it was the cyst or not, and so tapped rather than make any separation of the peritoneum. Some pints of red serous fluid escaped, and more still when the trocar was withdrawn. On enlarging the opening some small intestines appeared floating in the remaining fluid. On examination it appeared that a multilocular cyst had given way behind, and that its sac formed one general cavity with the peritoneum. Below a large secondary cyst was prominent. This I tapped and emptied, and then found the whole of the outer coat of the large cyst so intimately adherent not only to the abdominal wall, but also to the uterus and sides of the pelvis, that I determined not to attempt any separation, especially as some hardish white

nodules which were irregularly scattered about the cyst walls were very suspicious in appearance, and strongly suggestive of carcinoma.

Very little blood was lost; only one ligature applied, and that to a small vessel divided at the first incision. The wound was closed with sutures. The peritoneum was so altered in character that during the operation it was impossible to distinguish it from the cyst wall by appearances, and after opening the cyst the general adhesions seemed to be inseparable. The operation confirmed the previous suspicion which had arisen as to the rupture of a cyst before the tapping, and the diagnosis of malignant disease which the cachectic looks and general symptoms had suggested. She died about sixty hours after the operation.

Report of examination thirty-eight hours after death by Dr. Grenser, of Dresden.— 'Dressing had never been removed, and was nearly dry. The wound had united entirely outside and inside, and nearly without any discharge. The peritoneum, thickened, had entirely lost the character of a serous membrane —represented a thick, tough, ash-coloured membrane extending all over the abdominal cavity and its contents. It contained about two pints of reddish fluid without clots. The intestines were much distended, slightly adherent to the abdominal wound, but free in all other parts.

Cancer (fungus medullaris) of the mesocolon transversum, 10–12 inches in length and one inch in breadth, extending to the edge of the spleen, which is not involved. The cancer is very soft, and contains a great quantity of detritus.

Multilocular cyst of the right ovary, the size of a fœtal skull. One cyst showed the trace of tapping during the operation. The cysts do not contain much fluid, but mostly cancerous matter, not quite so soft as the cancer of the mesocolon.

Strong adhesive bands round the uterus and the ovaries, which entirely surround and hide the uterus and the left ovary, which could not be seen before separating the bands. Uterus small, healthy, except one small point, the size of a pea, on the fundus, which looks white and cancerous. Cyst of the left ovary the size of a walnut; no cancer.'

Another similar case was that of a widow, aged 51, who on

her admission to the Samaritan Hospital, in July, 1868, was in a pallid, anæmic state, much emaciated, with her feet cold and œdematous, and the breasts wasted. She had a hard, moveable nodule under the right false ribs, and a tumour in the abdomen, visibly moveable, without any evidence of adhesions. The parietes of the abdomen were thin, marked with numerous lineæ albicantes, but there were no dilated veins. A wave of fluctuation was felt over the surface of the tumour, and the sounds on percussion were clear two inches above the umbilicus, dull in the lumbar region. The cervix of the uterus was far back, the os open, and the cavity two and a half inches in length. The tumour could be felt in front of the uterus, and through the rectum. The appetite was bad, with pain after meals and relaxed state of bowels. She slept badly, lying best on the left side and back, had great depression of spirits, and though the sounds of the heart were normal, the pulse was 96, very weak and thready. She came of a healthy family, had lived in the country comfortably, and notwithstanding her delicacy had never been seriously ill.

The tumour began to form about twelve years before, but caused no inconvenience for six years. It then grew rapidly, filling the abdomen, without much pain, but giving rise to sickness, loss of appetite, irregularity of the bowels, and cramps in the left leg. The size had so much augmented of late that she had great dyspnœa and was unable to walk. I had seen her in 1866, and then diagnosed 'Uterine tumour, probably malignant.' At the date of admission, in 1868, I wrote, 'Abdominal tumour, surrounded by ascitic fluid—if uterine, an out-growth, as the tumour can be moved without moving the cervix.' She was twice tapped, about 12 pints of clear and slightly coagulable fluid being drawn off from the peritoneum each time.

On August 3, a tentative incision was made. A white glistening tumour was exposed on dividing the peritoneum. A few pints of clear fluid escaped, and I then felt the moveable nodule under the right false ribs to be apparently a lump of cancer in the abdominal wall. The uterus and ovaries seemed to be fused together, the intestines adhering behind; there were also some slight but vascular parietal adhesions. I did nothing more, and closed the wound. There was scarcely any hæmorrhage. She died about ten days after the operation.

The skin surface of the incision had not healed; there was some pus in the subcutaneous cellular tissue, but the peritoneal edges of the wound were firmly united. There were about three or four pints of serum in the peritoneal cavity, and adhesions of the omentum and transverse colon to the upper part of the tumour. A hard, white nodule as large as a walnut, in the abdominal wall below the right false rib, was found by Dr. Junker to consist of fibrillated connective tissue, with large, oblong, nucleated cells in an advanced stage of fatty degeneration. Both ovaries were fused together, and formed one tumour; unless a sebaceous and piliferous cyst on the left side was formed exclusively by the left ovary, and the rest of the tumour by the right. The uterus was small and normal, but closely connected, without anything like a pedicle on either side, with the ovarian growths. The liver was small, not hard, and its peritoneal coat adhered to the abdominal wall and diaphragm. The tumour was sent to Dr. Wilson Fox, who reported that 'he could find nothing but the ordinary cystic development. In fact, there were very few solid portions, less indeed than in many. There was much hyperæmia in many parts, and in others large tracts of fatty degeneration. The dermoid formation was limited to a very small portion of the tumour, and to one or two cysts. This seems often to be the case. It is rather singular that it should be so. In this part there was much sebaceous material.'

In all such cases suspicion of their real nature should be aroused if a patient has either a very thin and tense, or an œdematous abdominal wall, anasarca of the lower limbs, general emaciation, a cachectic aspect, free fluid in the peritoneal cavity, and especially so, if the loss of flesh and amount of pain are more rapid and severe than an ovarian or other innocent tumour would account for.

Tympanites and Phantom Tumours.—One may easily understand how tympanitic distension of the abdomen, which is not unfrequently seen in hysterical women, may give rise to some awkward questions; but, except from personal observation, or the testimony of men so accurate as Bright, Simpson, or Boinet, it is difficult to believe that any surgeon of reasonable experience, or in his right senses, could be so deluded by such a condition as to think that he had before him a case of solid

ovarian tumour, and attempt the operation of ovariotomy. Yet Simpson says that it has happened no less than six times, and Bright published the following case in his work on Abdominal Tumours:—'Susannah J., æt. 30, said to have been ill for two years, was admitted, under my care, into Charity Ward, September 29, 1824, complaining of abdominal pain and some hysteric symptoms. She had, in the middle line of the abdomen, about half way between the umbilicus and symphysis pubis, an unhealed scar, of about three inches in length. The deeper part of the wound had united, and it was filling up by granulation, as was a portion of the external part, at each end of the scar. It was evidently an incised wound, and the account she gave was that her abdomen being swollen, as it was at the time she had formerly been in the hospital, a surgeon proposed to her the excision of a tumour which produced this swelling, and that, with two assistants, he prepared to perform the operation, and made a free incision into the abdominal cavity; but finding that there was no tumour, brought the wound together, which now, after the lapse of several weeks, was as we saw it. The wound healed completely under common treatment, but her health remained in a most unsatisfactory state, both from the frequent tendency to diarrhœa and from the succession of pains, with occasional puffing up of the abdomen, of which she was the subject, so that she remained in the hospital till December 28.

During this long confinement the tumour of the abdomen varied a good deal, and was, on one or two occasions, reported to have subsided entirely.

I may mention further that I had seen this young woman many years before, when she was in Guy's Hospital for a supposed abdominal tumour, under Dr. Marcet, who, however, soon discovered its hysteric character, though, certainly, the abdomen bore a very peculiar appearance, strongly resembling an encysted tumour; but there were connected with this supposed tumour so many other ailments, embracing fits of hysterics, epilepsy, paralysis, abdominal and lumbar pains, so varied and so changing, that a little observation was sufficient to convince any experienced person of its real character.'

Boinet relates also that a miserable woman of weak intellect, tympanitic and impressed with the notion that she had an

abdominal tumour, was unfortunate enough to meet with two or three surgeons who, from some unaccountable motives, persuaded themselves that she had ovarian disease, and gave way to her importunate demands for an operation. Their rash gastrotomy only showed the existence of cancer, and killed the woman.

These hysterical distensions of the abdomen present themselves in a variety of forms. Sometimes the belly is uniformly blown up to the size of advanced pregnancy, and is rounded, hard, and resistant. The hand makes no impression on it, and change of position causes no alteration in shape. But, of course, there is no fluctuation—the resonance is universal, hysterical symptoms are generally present, and, under the influence of chloroform, the swelling entirely disappears, leaving the abdomen flaccid, and allowing the hand to rest upon the hard bones of the spine. In other cases the distensions are local, and it is noticed that they occur more often

on the right side. Portions of the abdominal wall are gathered up into rigid knots, which remain so long unaltered as fully to simulate an internal tumour, especially as they are sometimes situated over accumulations of hardened fæces, and are accompanied by a good deal of tenderness of the parts. Careful

and patient palpation, purgatives, and chloroform will generally lead to a solution of the mystery, or may even disclose the existence of an unsuspected incipient ovarian tumour, which, by its presence in the pelvis, had given rise to the train of hysterical symptoms, and, among others, to the superimposed swelling, apparently the most important matter calling for treatment.

The drawing on the preceding page, from a photograph by the late Dr. Wright, shows how very accurately one of these phantom tumours, or the condition which I have now been describing as hysteric tympanites, may resemble a uterine or ovarian tumour. The lower part of the abdomen arches forward exactly as in pregnancy, or as in an ovarian tumour of moderate size when the abdominal wall is not lax ; and the wall is so tense, the patient so resists pressure, or complains so much of tenderness on pressure, and the abdominal muscles contract so spasmodically and irregularly, that it is by no means difficult to fancy that a tumour, or even the movements of a fœtus, may be felt. The girl, whose portrait is here given, was in the Samaritan Hospital for some time, and it was difficult to convince her, her

friends, and even some medical friends who saw her with me, that she had no abdominal tumour. The tympanitic resonance

on percussion was, of course, the leading element in the diagnosis; but the most convincing test was the complete subsidence of the swelling, and the flattening of the abdomen when the girl was fully under the influence of chloroform. The photograph from which the second drawing was taken was made while she was completely narcotised. The arched abdomen is seen to have been quite flattened, and it was easy, when the abdominal walls were so flaccid, to feel the pulsations of the aorta, the vertebral column, the brim of the pelvis, and to become perfectly certain that there was no abdominal nor pelvic cyst of any kind. Yet the instant the effect of the chloroform began to pass away the tumour always began to reappear. This

was shown several times when the experiment was tried, and on one occasion Dr. Wright took a photograph when she was nearly awake, and the tumour was almost as prominent as in her ordinary condition, shown in the first drawing. She was an hysterical girl, but there was no voluntary or conscious imposition on her part so far as I could ascertain. She improved under a course of purgatives and steel, but I have not seen her since she left the hospital.

Early this year, a woman was sent to the Samaritan Hospital, supposed to be suffering from a large ovarian tumour. The tympanitic resonance, with the absence of fluctuation, at once showed that there could be no large abdominal tumour, but some

hardness above the pubes led to a vaginal examination, when an early pregnancy was detected. On administering chloroform the distended abdomen at once flattened down, and the outline of the enlarged uterus could be distinctly traced. This is the only case in which I have seen tympanites occur in a pregnant woman. I have, however, several times seen it accompanying small fibroid tumours of the uterus, uterine polypi, uterine displacements, and small ovarian tumours which have not risen out of the pelvis.

Fibro-plastic and fatty tumours of peritoneum and omentum.—The symptoms caused by the growth of large fatty and fibro-plastic tumours from various parts of the peritoneum or mesentery so much resemble those of true ovarian disease, that their real nature can only be determined in some cases by an exploratory incision or tapping. The difficulties and dangers attending these obscure diseases are exemplified in the histories of the cases which now follow.

A lobulated mass of fat weighing twenty pounds was removed from an unmarried lady, forty-three years of age. She had been suffering several years from an abdominal tumour, and for more than a year had been confined to her room. Various opinions had been entertained as to the nature of the tumour, and on October 24, 1867, I made an exploratory incision, and found that the tumour was a mass of fat. The opening was closed to gain time for consultation as to future treatment. The wound united well. The patient suffered very little, and it was arranged that an attempt should be made to remove the tumour. This was done on November 5, 1867, and large masses of fat were removed after dividing a loose cellular capsule. A large lobule felt in the neighbourhood of the right kidney was not disturbed. Not more than three or four ounces of blood was lost. Four vessels were tied in the tissue of the capsule. The tumour appeared to have originated in the mesentery. Some of the lobules were evidently *appendices epiploicæ* enormously hypertrophied.

The patient died fifty-eight hours after the operation. On post-mortem examination, traces of recent peritonitis were observed, but none of bleeding. The mass of fat left on the right side involved the right kidney, pushed the ascending colon over to the left, and adhered to the under surface of the

liver. Many mesenteric glands were enlarged and enveloped in fat. There was not more fat than usual in the omentum. The weight of the portion of fatty tumour not removed during life was estimated at ten or twelve pounds, but it was not weighed. The uterus and both ovaries were healthy.

Mr. J. Cooper Forster in the 'Pathological Transactions,' vol. 19, records another case of fibro-fatty tumour of the abdomen, weighing fifty-five pounds. 'The patient was a widow, sixty-three years of age, who had never had any children. About four years ago her abdomen began to increase in size; she fancied the swelling first commenced about the right iliac region, and it has continued gradually to enlarge. Her general health and activity of body have remained the same, the only inconvenience she seems to have suffered being a constant desire to pass her water and motions. A few months ago anasarca appeared in both legs; still she was able to get about till within a week of the time when Mr. Forster saw her. She was unable to lie down from fear of suffocation, and complained of great pain over the right lumbar region. For several weeks she had slept in an arm-chair. The abdomen was enormously distended, and exceedingly tense; there was a distinct sense of fluctuation, and the vibratile wave is most perfect over the whole. Mr. Forster did not hesitate to attempt to perform the operation of paracentesis abdominis, and plunged the trocar and canula into the abdomen in the usual place, but found the instrument evidently pass into a solid mass. Upon withdrawing the trocar no fluid escaped, but upon removing the canula a quantity of serum oozed out. Two other attempts were made—one of them at the umbilicus—to draw off some quantity of fluid, but without success. On each occasion the instrument evidently went into a solid mass. No further trial was made, under the belief that the mass was a solid, possibly ovarian growth, with probably a small quantity of ascitic fluid between it and the abdominal wall. The patient lived sixteen days after the operation, and died from apnœa.'

The following account was given of the post-mortem appearances:—'The parietes of the abdomen were very thin, and between them and the tumour there were adhesions everywhere, easily broken down by the hand. At the under surface of the diaphragm the separation had to be effected with the

knife, and a few of the muscular fibres were attached to the tumour. The ascending colon was seen lying on the front of the mass, and to the right of the mesian line of the body; no other viscera were visible. The intestines were placed behind and on both sides. The viscera were all healthy. Occupying the whole of the abdomen was the enormous mass, weighing fifty-five pounds upon removal, not attached by any pedicle or well-marked root to one spot. It was lobulated as an ordinary fatty tumour, but not quite so greasy.

Dr. Moxon said the microscopic examination of the tumour showed in all parts a large proportion of ordinary fat-cells. In the greater part of the tumour—the part that had the appearance of common healthy fat—these, with the usual connective filaments and vessels, made up the tissue, which was histologically perfect fat. But in the many firmer and more fibrous looking parts there was a greater quantity of the connective element than is present in common fat, and in it were great numbers of irregular caudate nucleated cells. These cells contained more or less, and generally much, granular fat. All grades of change from this granular state to that of true fat-cells could be seen, so that these granular cells probably are stages in the development of fat-cells from connective tissue.'

An unmarried woman, twenty-four years of age, supposed to be labouring under ovarian disease, was sent to me in June, 1869, by Mr. Turner of Manchester. She was delicate, of clear complexion and much emaciated, and had a bronchocele of four years' standing. The body was of large size, measuring at the umbilicus 40 inches, and from the ensiform cartilage to the pubes, 23 inches. The chest was much compressed, and the apex of the heart was felt in the 5th intercostal space one inch inside the left nipple. The tumour was not moveable, but there were no indications of adhesion. There was a little ascitic fluid in the peritoneum, and fluctuation was distinct, but not uniform. The umbilicus protruded slightly. Percussion gave a dull sound all over the tumour, and in both flanks. There was neither crepitus nor tenderness. The uterus was normal in size and position, and free; the lips of the uterus short, and the os open. The urine was clear, acid, specific gravity 1028, free from albumen, but contained crystals of

oxalate of lime and lithic acid, and great quantities of epithelium from the vagina and urethra. The appetite was good and the bowels regular; breathing 24 and regular; dulness of both apices and slight cough. The pulse was regular, 92, and there was pulsation of both jugular veins. She was subject to no hereditary disease, and had always lived in comfortable circumstances in the country. She suffered a little from indigestion and flatulent swelling in the hypogastrium about two years before, and twelve months ago began to notice that she was getting bigger, with only slight pain in the right iliac region when walking. The size gradually increased, the legs began to swell, and three months back the tumour came under the notice of Mr. Turner. For the last two months the increase has been more rapid, and the diagnosis was that of ovarian multilocular cyst with a little ascitic fluid. It was of no use tapping, and ovariotomy was attempted on June 23. An incision of five inches was made through the œdematous abdominal walls. A white solid tumour was exposed, lobulated, and apparently uterine, but possibly renal. I was unwilling to make any more extended examination in a subject so affected by goitre, and with the condition described of the apices of both lungs; especially as she struggled a good deal under the action of the methylene, and became cyanotic as its full influence was attained. I therefore closed the wound at once by silk sutures, after stopping some bleeding from one vessel by torsion. She recovered well, except one or two alarming attacks of syncope, and returned home—but died a year afterwards.

The wife of a railway guard, aged twenty-six, living at Bromley, Kent, was admitted into the Samaritan Hospital from St. Bartholomew's in December 1869. She had a child two years ago. She was very thin and pale, with cold extremities. Fluctuation was distinct in the abdomen, with dulness on percussion, and great tenderness in the pubic and left epigastric regions. The lumbar sounds were dull on the right side, clear on the left. The uterus was low, central, not very moveable, and appeared to be surrounded by closely connected masses of the tumour. Catamenia had been regular, but ceased three months ago. The urine was clear, sp. gr. 1027, with lozenge and cayenne pepper crystals of lithic acid, and

sediment of mucus and epithelium. The appetite was good, and the bowels regular. The respiration was 38 and regular; there was slight cough, and dulness on percussion over the apex of right lung. The pulse was 122 and small, with the normal sounds of the heart accentuated from the anæmic condition. She was of healthy family, lived well, and had only become delicate within the last two years, when after her confinement she felt a small lump in the right iliac region. This increased very slowly until the May of 1869, and caused very frequent nausea. Since May the growth has been rapid; and the diagnosis was—Ovarian tumour, closely connected with the uterus. She was sent down to Eastbourne for a time and returned in better health, with the uterus seemingly more separable from the pelvic portion of the tumour, which did not appear to be so low down in the pelvis. On February 23, 1870, an exploratory incision was made. On exposing the peritoneum some very large veins were seen on the surface of a dark blue tumour which was very elastic. Avoiding the veins, a trocar was introduced, and three or four pints of bloody serum escaped. Then I perceived that the tumour was an extremely vascular, soft, friable, granular mass, and satisfied myself by stopping the bleeding, which was rather free both from arteries and veins. Two or three were tied; solid perchloride of iron was passed into the cavity, and two pins were introduced, around which silk was twisted, to close the opening. The pins were fastened outside the abdominal cavity, and the wound closed with sutures. She died on the 3rd of March, and on examining the body eighteen hours after death, I found the tumour to be firmly adherent to the abdominal wall, to the liver and intestines, and to the uterus behind; but both uterus and ovaries were free from disease. In some parts there were detached bodies like large appendices epiploicæ, and from some of the intestines there were cyst-like growths, which I sent with the tumour, liver, spleen, and kidneys to Dr. Wilson Fox, whose report follows:—

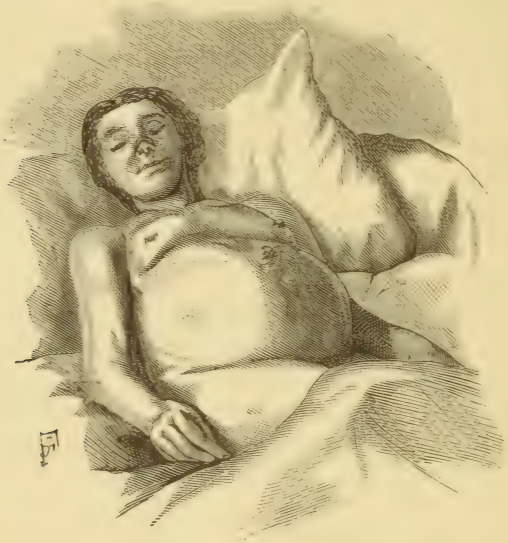
'I have examined the masses which you were kind enough to send to me at the College, microscopically. They appear to be of a malignant nature, but rather, perhaps, occupying a doubtful place between true cancer and fibro-plastic growth. As far as I can make out their origin, it appears to be either

omental or peritoneal. The growths on the intestine appear to originate very distinctly in the serous covering. They consist almost entirely of spindle-shaped, and caudate, and large round nucleated cells, together with an abundant supply of blood vessels, which are very large and greatly distended. In many places these have ruptured both on a large and on a small scale. Whether such extravasations have been the origin of the cysts is in all cases difficult to determine. In some places this mode of origin is pretty distinct; in others, the cysts appear to originate from an acute fatty disintegration and softening of parts of the tumours; but in others the cysts appear to have originated as spaces filled with a sort of albuminoid, semi-fluid material analogous to those found in enchondromata. I could find no secondary implication of the other organs—a fact which appears to militate against the malignant nature of the original mass. The liver, spleen, and kidneys, all softened and "cloudy," present merely the affection common to these organs in septic and acute inflammatory disease.'

Hydatids.—Hydatids growing from some part of the peritoneal surface often acquire an enormous bulk, and distend the abdominal walls in proportion. The displacement of the viscera, the encroachment on the thoracic region, and the coincident interference with the action of the heart and lungs, are as marked as in advanced cases of ovarian disease. But the history of a case of hydatids will commonly show that the dilatation commenced in the upper part of the abdomen, extended next to the hypochondria, and, lastly, to the pelvic region. The growth of hydatids is generally more rapid than that of ovarian cysts. There may be similar irregularities of surface and contour felt by pressure, but the interspaces or depressions between the projecting masses will be more distinguishable in hydatid disease, and are sometimes marked by distinct resonance, when portions of distended intestine happen to be lying in them. The abdominal resonance is more lateral in hydatid disease than in cases of ovarian tumour, but in both cases will be limited to the part in which the bowels are pent up. The fluctuation in hydatids is mostly obscure and circumscribed; but when it can be felt the hydatid fremitus is decisive. It must after all be remembered that hydatids may originate in any part of the

peritoneum, and when they happen to do so in the region of the broad ligament the diagnosis will demand additional circumspection.

The best marked case of hydatids of the peritoneum, as distinguished from hydatid cysts of the liver, which I have seen, was a woman who was in the Samaritan Hospital in 1870-71. The appearance of her abdomen is extremely well shown in the drawing, which has been copied from a photograph taken soon after her admission to the hospital.



The abdomen had all the appearance of a case of multilocular ovarian cyst. Fluctuation was very distinct, but the chief peculiarity of the case was the existence of numerous hard nodules scattered over different parts of the abdominal wall. They were evidently either attached to the abdominal wall or formed part of it, and at first suggested the belief that they must be scattered nodules of cancer. Some of the best marked of these are shown on the drawing near the umbilicus. They were quite as hard as nodules of hard cancer, and some of them being semi-resonant gave rise to the fear that they might be formed on the coat of intestine; but the fact that the disease was of about twelve years' duration, that she had borne healthy children during its progress, that the

patient was not much emaciated, did not suffer from sickness or diarrhœa, nor from much abdominal pain nor tenderness, showed that cancer might be almost certainly excluded from the diagnosis, even before hydatid fremitus was noticed. This was most distinct, and the diagnosis was completed by the puncture of one of the nodules felt in the abdominal wall with a fine trocar. A little clear fluid escaped, in which the hooklets of the echinococcus were distinctly seen. No very urgent symptoms being present, nothing more was done, and the woman went home. She was afterwards in the Middlesex Hospital under Dr. Murchison, who also pointed out the hydatid fremitus to his class. She again went home, and then, after further enlargement of the abdomen, and some signs of chronic peritonitis, was readmitted into the Samaritan Hospital, and I determined to attempt the removal of the hydatids. After making an incision of three or four inches in length in the median line below the umbilicus, some free peritoneal fluid escaped, with numbers of hydatid cysts of various sizes, some quite free, but most of them having some attachment to omentum or mesentery. Several groups of them were removed with the attached portions of mesentery, a few small mesenteric vessels requiring ligature. Between three and four pounds of these hydatids, varying in size from a pea to a small apple, were removed. Those in the abdominal wall could not be separated, but I punctured several of the largest, hundreds being still left undisturbed. The wound was closed by suture. No bad symptom followed the operation; on the contrary, considerable relief was given. The patient went home, but I have since ascertained that she died in December, 1871. Some of the groups of hydatids were shown at the Pathological Society by Dr. Murchison, and it was considered at the meeting that this was the first instance in which an operation for the removal of peritoneal hydatids had ever been undertaken after the diagnosis had been correctly made.

It is extremely probable, although the origin in this case was not clear, that it was from the liver. Hydatid cysts of the liver having given way, the dispersed progeny had gone on multiplying, and formed attachments in various parts of the peritoneum.

Large hydatid cysts of the liver extending low down in the

abdomen, or even into the pelvis, have frequently been mistaken for ovarian cysts. In one such case, a young lady who was sent to me by Sir James Clark, I was able, with the assistance of Sir William Jenner, to make an accurate diagnosis, and removed sixty-four ounces of clear fluid from an hydatid cyst which projected downwards from the liver. Two years elapsed before any of this fluid re-collected. I then tapped again, and found only nine ounces in the cyst, the patient being apparently well some few months afterwards. In two similar cases, in the Samaritan Hospital, emptying hydatid cysts of the liver by tapping, assisted by an exhausting syringe, has been followed by what we may confidently hope is a permanent cure. In another case, after tapping, the cyst suppurated, its contents decomposed, the cyst became distended with gas, and I inserted a drainage tube. Daily injections of iodine solution were used, and the patient completely recovered.

Such cases are not likely to be mistaken for ovarian cysts by anyone conversant with the signs of hydatid disease of the liver, so well described by Frerichs and Murchison. The freedom of the pelvis and hypogastric region from the presence of a cyst, and the limitation of the evidences of disease to the upper part of the abdomen, are, of course, the main points of distinction.

I have never seen a case of hydatids in the substance of the ovary, and it is curious that these organs seem to be avoided as the seat of parasitic life, for it is probable that in the reported cases it was only by superficial attachment to the peritoneal covering that the hydatids had any relation to the ovary.

Pregnancy.—Certainly the most common mistakes in the diagnosis of ovarian tumours occur when the uterus is enlarged from some cause, and pregnancy is the most common of all causes of enlargement of the uterus. When a patient has no reason for deceiving her adviser, doubt or difficulty will often arise ; and in cases of pregnancy, real or suspected, the patient may mislead the surgeon intentionally, or from her own hopes or fears biassing her judgment. An unmarried girl, or a married woman whose husband is absent, or a widow, may have very strong reasons for concealing pregnancy, and hoping or asserting that she has an ovarian tumour. Or a sterile wife, or one advanced in age, suffering from a tumour, may have

grounds almost equally strong for hoping that she may be pregnant. A patient was sent to the Samaritan Hospital, supposed by an experienced surgeon to be suffering from ovarian tumour, but she denied most positively the possibility of pregnancy, and after a premature labour, probably brought on by detection of the imposture, accused my assistant, the late Dr. Ritchie, who was hastily called to her, of having brought a child which was not hers, in order to shield me from the charge of having made a mistake. And in many cases of ovarian tumour patients have believed themselves to be pregnant, medical men have been engaged to attend upon them, and the true nature of the disease has only been detected when the natural period of pregnancy had long passed over.

In some cases when pregnancy may be suspected, doubt may be solved very easily. For instance, a tumour as large as the uterus at the seventh or eighth month of pregnancy may have been present for a year or more, and the conclusion is drawn at once that the case cannot be one of simple pregnancy. So in patients either very young or very old, pregnancy may be negatived, although cases are on record where girls between twelve and fifteen, and women up to sixty, have borne children. Still the limits of fifteen and forty-five are very rarely passed. Again, some malformations of the generative organs render pregnancy impossible; but it must not be forgotten that impregnation has been effected where penetration of the vagina by any solid body was impossible, in spite of procidentia of the uterus, and of such diseases of the vagina and uterus, as vesico-vaginal fistula or uterine cancer, as might appear quite inconsistent with sexual intercourse.

In many of the cases where a diagnosis must be made, it would be an insult to ask the patient if she believed herself to be pregnant. But if this can be done and reliable information obtained as to the cessation of menstruation, if this has ceased for a certain number of months corresponding to the gradual increase of the size of the abdomen, it is a fact of primary importance, but in many cases of no great value. Amenorrhœa from mental causes, from super-involution of the uterus, from chronic metritis with enlargement of the uterus, or from advancing age, may be the cause of the cessation; and on the other hand a woman may be pregnant who menstruates regu-

larly, or thinks she does. In some very rare cases a woman has had regular monthly discharges during the whole period of pregnancy; and they certainly recur often enough during the first two, and sometimes three or four, months, to lessen the value of the symptom and to render the exact period of the pregnancy doubtful. So in the later months, irregular hæmorrhage from threatened abortion, or low situation of the placenta, may be tolerably frequent, and regarded by patients as regular monthly periods. Again, pregnancy may occur when the menses are absent from some other cause. Girls who have never menstruated may become pregnant; so may women while they are nursing, or at an age when menstruation has apparently ceased.

The other general symptoms of pregnancy, nausea and vomiting, salivation, irritable bladder, and irregular nervous symptoms, are not without diagnostic value. But they are of little importance compared with what can be seen by observation of a patient quite independently of her own impressions or statements.

A glance at some women will raise a strong suspicion of pregnancy. The forehead and part of the face have a brownish tint which in brunettes is occasionally so deep and well-marked as to look like a mask. In many abdominal tumours there is some bronzing of the face; but very seldom so completely as in pregnancy. When the pigment has once been deposited it may remain permanent, so that the value of the sign is greater in a woman who has not had a child.

Pigment is also deposited during pregnancy in the median line between the umbilicus and the pubes, and around the nipples of the breasts. These marks are strongly presumptive of pregnancy, but in the breasts are subordinate to other changes. The breasts usually enlarge at the commencement of pregnancy and go on increasing in size to the end; or they may not increase after the fourth month. Still more rarely they do not swell at all until after delivery. The skin is stretched, the subcutaneous veins enlarge, the inner layer of skin gives way, and purplish lines appear which soon become silvery, and are not inaptly termed lineæ albicantes. Colostrum may be squeezed from the nipples at any period of pregnancy, but most commonly in the later months. At the end of the

second month the nipple becomes more prominent, more erectile, and darker in colour than before. The skin close round it becomes yellowish. The colour deepens, and towards the end of the fourth month the nipple is surrounded by a brown areola about three-quarters of an inch in width. From the surface of this zone from twelve to twenty small glands project. They are more numerous in the under than the upper segment of the circle. When pressed they exude a thin milky fluid. About the end of the fifth month a second areola is formed around the other. It is mottled by numerous small islands of bleached surface, a sebaceous follicle opening in the centre of each. This double areola and the glandular bodies are never well-marked in abdominal enlargement from ovarian or any other form of tumour except pregnancy, and may be relied upon with great confidence, provided the woman has never been pregnant before. But sometimes the changes in the breast and the nipple are so slight, especially in the early months, as to render very little assistance in diagnosis, or even to mislead, by strengthening the belief that other causes have led to the increase in size.

The urine of pregnant women, after standing about two days exposed to the air, becomes covered by a distinct pellicle, which breaks, falls to the bottom in flakes, and is succeeded, as putrefaction commences, by another pellicle, both consisting of vibriones, fat globules, and crystals, chiefly of ammonio-magnesian phosphate. This pellicle or flaky substance has been called *Kiestine*, and is the result of the action of air upon urine which contains a large amount of nitrogenous matter. It is not found in the urine of healthy women who are not pregnant, except they are nursing. Kane found it forty-four times in ninety-four women during lactation. It has never been found before the second month of pregnancy, and it is not common during the last six weeks. It is from the third to the sixth month that it is found most frequently and with the best marked characters; but even then it may be absent, for it cannot be found if the urine is strongly acid. And it may be difficult or impossible to distinguish this pellicle from those which are common in catarrh of the bladder with alkaline urine.

Changes in the configuration of the abdomen may be ob-

served in the early months of pregnancy, before the uterus rises out of the pelvis: indeed the sinking of the heavy uterus before it rises causes a flattening of the lower part of the abdomen, which led to the proverbial French doggrel :—

En ventre plat
Enfant il y a.

Early in the third month the abdomen has again become prominent, and the prominence goes on increasing as the uterus enlarges.

The umbilicus is usually depressed and deepened, as if pulled upon by the heavy sunken uterus, until the third month; in the fourth month the depression disappears. Towards the sixth or seventh the umbilicus is flattened, and becomes prominent, and the umbilical ring widened. But the diagnostic value of these signs is not great, as they are common to a variety of abdominal enlargements. Dr. Montgomery believed that an abdominal tumour, bound down posteriorly by adhesions, would not have any effect on the umbilicus. Whenever the prominence is considerable, the ring open, the skin thin and distended by fluid, there is almost always free fluid in the peritoneal cavity, and further examination is required to ascertain if, in addition to this fluid, any ovarian or other tumour is present.

The superficial veins of the abdominal wall are seldom so much distended in pregnancy as they often are with large ovarian tumours; but lineæ albicantes are more common in pregnancy. They are seen, however, over all large tumours of rapid growth. When recent they are of a dark purplish colour; when old they are white, glistening, or silvery. When the abdominal wall is œdematous, the lineæ become very prominent. This appearance, common in large solid or semi-solid abdominal tumours, is rare in pregnancy.

When the uterus is so far enlarged by pregnancy as to be felt like a distinct tumour, it resembles an ovarian tumour by pushing the intestines aside and backwards—giving rise in both cases to dull sounds on percussion in front, clear at the sides and behind. At the fourth month the fundus can be felt just above the brim of the pelvis. At the fifth it is a finger's breadth below the navel. At the end of the sixth month a finger's breadth above the navel. At the end of the eighth

month it is three fingers' breadth above the navel. At the end of the ninth lunar month it is close to the ensiform cartilage. A fortnight before labour it once more sinks into the position which it had at the end of the eighth month. A knowledge of these changes enables us to decide at once in some cases of doubtful diagnosis. If we have a tumour of nine months' certain duration, and yet it is no larger than a uterus at the fourth or fifth month—or if we have a tumour of only four or five months' standing, as large as the uterus at the close of pregnancy, we may dismiss the supposition of pregnancy. But I have recently seen a case of twin pregnancy at the fifth month, where three gallons of liquor amnii were discharged with the children, in which fluctuation was quite distinct, and the abdominal distension as great as at the end of the ninth month of an ordinary pregnancy.

The pregnant uterus may be prevented from rising to its usual height by some abdominal tumour lying above it. If the tumour is cystic, the evacuation of the contents of the cyst at once alters the position of the uterus. From a lateral position it may become central; or if scarcely above the pelvic brim, it may immediately rise above the umbilical level.

Up to the fifth month the pregnant uterus gives no sense of fluctuation; it has rather the consistence of a glandular or fatty tumour. After the fifth month the sensation conveyed to the finger is that of displacement of fluid allowing a hard body to be felt. This is the fœtus, which from the sixth to the ninth lunar month may be pushed from side to side. After the seventh month it is often possible to trace the general outline of the fœtus so clearly that no mistake can be made. But when the abdominal wall is thick, some of the more solid varieties of ovarian tumour may very closely resemble the shape of a fœtus. An ovarian tumour surrounded by ascitic fluid, or a mass of small cysts projecting into a large one, may be moved very much like a fœtus in the liquor amnii. But the independent movements of the fœtus are very characteristic, and if felt, conclusive. Sometimes, however, with a living child these movements cannot be felt; and if the child is dead, of course they cannot be made.

The sounds of the fœtal heart may be heard at the fourth month, and are often distinct at the end of the fifth lunar

month, sounding like the ticking of a lever watch under a pillow. The beat is double at the spot where it is loudest, and on receding from that spot the first sound becomes less and less distinct till only the second sound can be heard. The fœtal pulse averages 140 in the minute. If above 150 or below 110, the fœtus is suffering. If the sounds are distinctly heard, pregnancy is indubitable. But certain fallacies must be guarded against.

1. The supposed fœtal pulse may be the maternal pulse, either single or dichronous.

2. The pulse of the observer may be heard, alone or with that of the patient.

3. A rumbling sound produced by contraction of the uterus or of the abdominal muscles may be heard.

Any error from these sources may be avoided by counting the pulse of patient and observer, and comparing the rate with that of the supposed fœtal sounds. It is only when the abdominal wall is very thick, the fœtus misplaced or dead, that the heart sounds cannot be heard after the sixth month. Sometimes they are masked by the placental murmur, a double blowing sound synchronous with the beat of the maternal heart, which is rarely absent in pregnancy, but is very similar to a sound which is common in large fibroids of the uterus, but very rarely perceptible in ovarian tumours. The aortic sound and impulse of the mother, being perceptible both in pregnancy and in many uterine and ovarian tumours, are of very little diagnostic value.

In women who are menstruating, the mucous membrane of the vulva and vagina is of a dark red colour which fades away as the discharge ceases. After conception, the colour, instead of fading, is deepened, and by the end of the fourth week becomes violet or purple, and retains much the same hue during the whole period of pregnancy. Dr. Barnes says he can verify the observation of Dr. McClintock, that the violet colour of the vagina disappears if the child dies. This change of colour does not occur in ovarian disease when not complicated by pregnancy.

When making a vaginal examination by the finger, attention must be paid to the position of the uterus, its size and weight, and to the condition of the os and cervix. During the first three months of pregnancy the uterus is generally lower in the

pelvis than natural. Then it rises and remains above the pelvic brim till the last fortnight. During the first two months the uterus feels larger and heavier than usual. After the third month there is a distinct widening out of the lower segment, which then feels like a rounded tumour, dispersed around and above the cervix. After the uterus has risen into the abdomen, it is possible by combined internal and external manipulation to assure oneself that the abdominal tumour, the pelvic tumour, and the cervix uteri are all in one, and move simultaneously. From the sixth to the ninth month, most clearly about the eighth, the fœtus may be made to *ballot* upon the finger in the vagina.

In order to get internal ballottement, if the patient be lying on her side, the forefinger must be applied behind the cervix uteri. It is kept still a moment so as to allow the actual resistance to be appreciated, then by a sudden flexion an impulse is given upwards and forwards in the axis of the pelvic brim. In a moment the small hard body comes down and impinges against the finger which tapped it, communicating the sensation of a ball contained in a bladder full of water.

If ballottement is not to be felt when the patient is on her side, it ought always to be felt for in the erect position ; when it rarely is absent at the period of pregnancy already indicated.

The earliest period at which ballottement can be felt is the fifth month of pregnancy. At that time the examination should be made with the patient lying on her back. The forefinger of the right hand is to be placed on the lower segment of the uterus, while the left hand presses firmly on the fundus of the womb.

A sensation of ballottement may be communicated to the finger by a large stone in the bladder, or even by the heavy fundus of an anteflexed uterus being felt through a distended bladder. Internal, like external ballottement, may be simulated by a hard tumour floating in ascitic fluid, or by a large cyst containing internal projections.

If the placenta present, ballottement is often masked. It is always most distinct when the head is the presenting part, but it may be felt with the breech, or even one of the small extremities. It is always absent in cross births, unless one of the small extremities present.

Sometimes the inferior segment of the womb is so thin, that the presenting part can be felt very distinctly through it. The fontanelles and sutures of the cranium may be so distinct, that it is with difficulty a novice believes they are actually covered by a layer of uterus. Of course, in such a case, there could be no possibility of making an error in diagnosis. In other cases the fœtal inequalities are felt but indistinctly, and here caution is necessary, as the inequalities of an ovarian tumour often simulate very closely those of the breech or shoulder, or other portions of the fœtus which might be supposed to present. I have known one of the best writers and teachers of midwifery declare that he could feel the foot of a child—both heel and toes—yet this was only part of a malignant ovarian tumour.

The changes which take place in the os and cervix uteri are of great importance in the recognition both of the existence and the period of pregnancy. Changes are perceptible even during the first month after impregnation. The mucous membrane around the os feels thicker and softer than before, but up to the end of the fourth month the increase of the thickening and softening is very slow. By the end of the sixth month, nearly the whole of the vaginal portion of the cervix is softened, and is felt as a flexible projection, the movement of which is limited by the hard circle felt at the level of the vagina. During the last three months, an inexperienced examiner has difficulty in distinguishing the softened cervix from the coats of the vagina.

This softening of the vaginal portion of the cervix takes place in all cases of pregnancy, except when the cervix itself is diseased, as in some cases of cicatricial induration, and of cancer.

Accompanying the softening of the cervix, and the increase in the size and weight of the uterus, and the alteration in its position which are characteristic of early pregnancy, there are corresponding changes in the vagina. The change of colour has been already described. A very constant change in the anterior wall of the vagina has been extremely well described by Dr. Barnes. At the Oxford meeting of the British Medical Association in 1868, he described the elevation of the cervix, the os being higher up and farther back, and the fundus ante-

verted, and he added that 'the elevation and retrogression of the vaginal portion is impeded by the intimate union existing between the anterior wall of the cervix uteri and the base of the bladder. The neck of the uterus can only rise backwards by dragging the neck of the bladder along with it. This produces peculiar conditions very perceptible to the touch. The resistance opposed by the mass of cellular tissue that binds the uterus to the bladder is partly overcome by stretching. The cellular tissue is remarkably extensile; and the extensibility of the vaginal wall is well known. The mass of intercervico-vesical tissue plays an important part in pregnancy and labour. During pregnancy, it undergoes the stretching referred to. During labour it is still further stretched; it is by virtue of this free extensibility that the lower part of the uterus glides down into the pelvis before the advancing head, the bladder and anterior wall of the vagina remaining more fixed. In this way, small vessels are commonly torn, and hæmatocele or small extravasations of blood take place in the loose tissue. These extravasations are very common; but a condition I have never found wanting in every case in which I have had the opportunity of examining the body a few days after labour, is a large effusion of serum. This, of course, is readily absorbed, and the stretched cellular tissue recovers its normal compactness. Thus the space between the uterus and bladder is elongated. This stretching and elongation is attended by a stretching and smoothing out of the anterior and upper wall of the vagina. This change in the vagina is very remarkable. Instead of the deep groove or *cul-de-sac*, commonly found in the non-pregnant state in front of the os uteri, the os being lifted up, and brought nearly into a straight line with the anterior wall of the vagina, we find the anterior aspect of the cervix from the edge of the os, forming a continuous plane with the upper part of the anterior wall of the vagina.

'The features of this plane vary with the epoch of pregnancy. During the first month, whilst the anteversion or mutation of the body of the uterus is yet moderate, the vaginal *cul-de-sac* is not quite obliterated; the length of the plane, measured from os uteri to the lower edge of the symphysis pubis, is about two inches; the natural corrugations of the vagina are not lost; and there is an elastic sensation in the course of this

plane through which it is not always easy to feel the body of the uterus, which rests upon it. But, at the end of two months, the features are less ambiguous. The os has been tilted higher up; the body of the uterus is larger, and its mutation is more marked. The connecting tissue between uterus and bladder is more stretched; the vaginal mucous membrane, also stretched in a corresponding degree, is smoother and more tense to the feel; and the uterine body reclining upon it is felt firm and rounded through it, an elastic cushion intervening. If the abdominal walls be not too thick and resisting, the fundus of the uterus can be felt by the hand pressed in above the symphysis, so that the size, shape, and position of the uterus can be measured between the two hands.'

When we have combined the altered position and consistence of os and cervix, the smooth stretched anterior wall of the vagina, the deepened colour of vagina and vulva, and the rounded uterine body and fundus felt through the vaginal plane—even if the corresponding mammary changes are absent—early pregnancy may be confidently assumed.

The greatest difficulty in diagnosis arises when the uterus either undoubtedly contains something, or is enlarged as in pregnancy. The so-called moles or hydatids, which are really hydatidiform degeneration of the chorion—intra-uterine polypus—cancer of the body and fundus of the uterus, while the cervix remains unaffected—hæmatometra, hydrometra, and physometra—are all conditions which must be borne in mind, and which may resemble ovarian tumours in some particulars, pregnancy in others.

If the uterus instead of a fœtus should contain a mole, the breasts may swell, the catamenia cease, and all the other signs of pregnancy may be present for a time. Usually molar pregnancy comes to an end about the third or fourth month, but cases are on record where it has been protracted to the thirteenth and fourteenth months, and Churchill alludes to a case where an unmarried woman had a frequent discharge of 'uterine hydatids' throughout her menstrual life. In molar pregnancy the uterus does not enlarge so regularly as in ordinary pregnancy. The enlargement is usually more rapid, and the functional disorders are more intense. I once saw a woman fully as large as at the end of a normal pregnancy, with a supposed ovarian

cyst. While we were examining her in the outpatients' room, uterine contraction came on ; and with very little help by fingers in the vagina and pressure on the abdomen, nearly a pailful of these 'hydatids' were expelled.

An intra-uterine polypus has often been mistaken for pregnancy. After the dilatation of the cervical canal, and commencing expulsion from the os, it has even been supposed that abortion or labour was going on. But it is not likely that this condition would be mistaken for ovarian disease.

Cancer of the body and fundus of the uterus, causing enlargement above while the cervix is unaffected, may be taken for an ovarian cyst which is lying above the uterus, or for pregnancy. But the general cachexia, uterine discharge, and absence of fluctuation will be sufficient to distinguish this condition from ovarian disease, and some of the characteristic signs of pregnancy are certain to be absent.

Collections of blood, or retained clot, the so-called fibrinous polypi, or of masses of dysmenorrhœal membrane with blood or clot, all conditions described as hæmatometra, are more likely to be mistaken for pregnancy than for ovarian disease ; but some of the signs of pregnancy will certainly be wanting, and the signs of enlargement of the uterus are sufficient to distinguish this condition from ovarian disease.

Hydrometra, again, is recognised by the enlargement of the uterus without the other characteristic signs of pregnancy, before any watery discharge clears up doubt. Many supposed cases of hydrometra have undoubtedly been cases of ovarian cysts emptying themselves through the Fallopian tube into the uterus and vagina.

Physometra is a very rare condition—generally the result of decomposition of part of a retained ovum, or of blood clot. The resonance on percussion of the enlarged uterus is sufficiently characteristic.

Now bearing in mind the various symptoms and signs of pregnancy while the uterus is still a pelvic tumour, and afterwards when the uterus has enlarged, risen, and become an abdominal tumour, it will be seen how they resemble and how they differ from those which characterise ovarian cysts and tumours, uterine tumours, and extra-uterine fœtation.

When an ovary is only slightly enlarged, it usually lies

behind the uterus and may be felt by vagina or rectum. It does not at all resemble the enlarging uterus of early pregnancy. As the ovary enlarges it usually rises up out of the pelvis; but it sometimes remains low down either from pressure or adhesion, and as it enlarges it pushes the uterus either to one side, or backwards, or forwards. It may restrict the mobility of the uterus, but the independence of the one of the other may generally be made out. As the ovary enlarges, it may rise into the abdomen and leave the uterus quite in its normal position, without any deviation or modification of mobility, or alteration in the cervix, or it may drag up the uterus quite out of reach, elongating the vagina, so that nothing but the ovarian tumour can be felt through the vaginal walls; or the os may just be reached, high up above the pubes if the ovarian cyst is behind the uterus, or near the promontory of the sacrum if the cyst is in front. This displacement of the os backwards by a cyst in front of it simulates pregnancy, but other signs are wanting. In case of doubt delay of a month or two would clear it up.

It is possible that the rate of growth of an ovarian tumour may closely resemble the rate of the enlargement of the uterus in pregnancy; but it is much more likely to enlarge at a very different and much less regular rate, and to remain for weeks or months without much alteration in size. The fœtal movements and heart sounds are wanting, and there is probably a less dense or solid, if not a distinctly fluctuating tumour.

The distinction between pregnancy and fibroid tumours or enlargement of the uterus will be alluded to hereafter. We have now to consider the important subject of

Ovarian Disease complicated with Pregnancy.—Ovarian tumours may not only be mistaken for pregnancy when they exist independently, but they are often complicated by its occurrence even in advanced stages of their growth. And though the diagnosis of this condition is generally to be made out in the course of ordinary treatment, yet the complication may be revealed only at the time of the operation. Out of these circumstances several very important practical questions arise.

It may be asked, in the first place, whether in such a case it would be necessary to interfere at all, under the assumption

that pregnancy and ovarian disease might go on together, and serious trouble arise only in a small per-centage of cases. The early induction of premature labour has also been advocated on the grounds that rupture of the cyst, or its gangrene from rotation of the pedicle, were apt to occur under the pressure of the enlarging uterus, while relief was often found in the advent of spontaneous premature labour. Some practitioners, again, have declared themselves in favour of tapping the ovarian cyst, rather than inducing premature labour, thus anticipating the dangers of rupture or gangrene of the cyst without sacrificing the child. And then comes the triple question, in reference to ovariotomy,—whether it should be performed at all during the existence of pregnancy; whether, if done, it should be supplemented by the Cæsarean section; and, thirdly, whether if, during ovariotomy, the uterus should give way or be accidentally opened, its contents should be cleared out, or the parts left to themselves.

These questions are of such vital importance that we may endeavour to arrive at some general principles or useful guides in practice by the consideration of a series of cases in which the several difficulties presented themselves.

In commencing the study of the treatment of these cases, we naturally examine the assertion that no treatment at all is called for; that ovarian disease and pregnancy may, as a rule, be allowed to progress together without interference. I might support this doctrine by the fact that I know one woman who, during the slow progress of an enlarging ovarian cyst, has gone through five pregnancies, has borne five living children without unusual difficulty, and has never yet had the cyst tapped, nor has labour ever been prematurely or artificially induced; and by the fact that in another case where I performed ovariotomy successfully fifteen months after the birth of twins, the patient had begun to enlarge six months before marriage, and had only suffered from her excessive size during this pregnancy; and by the fact that a patient, upon whom I performed ovariotomy with success in the fourth month of pregnancy, after rupture of the cyst and peritonitis, had borne six living children during the progress of the cyst before its rupture. But I must regard these cases as exceptional, for I cannot

remember one other case where pregnancy complicated with ovarian disease has gone on to its natural termination in the birth of a living child; or where, in consequence of non-interference, great suffering has not arisen during or after labour, or very grave danger from rupture or rotation of the cyst; or where it has not been necessary to guard against threatening danger, and either to tap the cyst or to induce premature labour.

In the first three cases, which I now proceed to narrate, death followed the spontaneous rupture of an ovarian cyst in or before the seventh month of pregnancy.

Case 1.—On the 26th of July, 1864, I saw a lady, 29 years of age, the wife of a medical man and mother of three children, the youngest of whom was eleven months old. The catamenia had ceased eighteen weeks before my visit, and the usual symptoms of early pregnancy followed, but with severe paroxysms of pain in the right groin and right side of the abdomen. Dr. Ballard had been consulted on the 13th of June, and he afterwards informed me that he then detected ' fulness, with a hard, irregular tumour partially fluctuating and somewhat tender, in the right flank, moveable and dull on percussion, the fundus of an enlarged uterus being palpable above the pubes, with resonance between it and the tumour.' As the tumour grew, it extended across the hypogastrium and obscured the enlarging uterus, producing changes in the physical signs and increased sufferings, which led to different opinions being expressed as to the nature of the abdominal enlargement, and to my being consulted. Considerable doubt having been expressed as to whether a tumour which reached upwards about midway between the pubes and umbilicus was this enlarged uterus or not, I introduced the sound to the extent of six inches, having previously considered in consultation that if this proceeding should lead to abortion the result would not be undesirable. The fœtal heart and placental murmur not being audible, doubt was still felt whether the enlargement of the uterus was due to pregnancy. The uterus was pushed a little over to the left side; while on the right, not crossing the median line, an elastic

tumour extended upwards beneath the false ribs, and could not be separated by percussion from the liver. I suggested that if premature labour did not come on, this tumour should be punctured. I did not see the patient again; but I have since heard from Dr. Ballard that on the 11th of August, a fortnight after my visit, he 'distinctly felt the movements of a child to the left of and below the umbilicus. The patient had by this time lost flesh considerably, but her pain had been tolerable, and for some days she was free from it altogether. On the 26th of September it returned with great severity, with evidence of peritonitis. On the 28th she was believed to be in labour, and was seen by Dr. Oldham and Dr. Barnes. The membranes protruding, they were ruptured, and some hours afterwards a female child was born, which lived twenty-four hours. The symptoms of peritonitis continued, and the patient died four days after the delivery.'

After death Dr. Ballard found a very large cyst of the right ovary, occupying the whole of the right side of the abdomen, and extending four inches to the left of the median line. It was flaccid, as if partially emptied, and a large quantity of bloody serous fluid lay in the lower part of the abdominal cavity. The pedicle, an inch and a half long, was twisted into a sort of rope, and the walls of the cyst were infiltrated with blood. Within the cyst there was much bloody serum with several very firm clots. Some of the contents of the cyst had evidently escaped through an opening in a very thin part of the cyst wall posteriorly, and had, no doubt, caused the peritonitis which proved fatal.

Case 2.—In May, 1868, I went to Stafford to see, in consultation with Dr. Day, a lady who was in the fifth month of pregnancy and was also suffering from an ovarian tumour, which had been discovered by her husband on the night of marriage in October, 1866. She was twenty-four years of age, had long suffered from hysterical attacks, but nothing had led to any examination of the abdomen until the moveable tumour in the right iliac region was discovered, which she appeared to be quite ignorant of, and said she had never noticed. It was about the size of a very large orange. Dr. Oldham, who saw it a few days after-

wards, considered it to be an ovarian tumour. From the time of marriage, the tumour evidently but slowly increased in size, and was the seat of frequent darting pains. Eight months after marriage she became pregnant, miscarried six weeks after conception, and recovered without any unfavourable symptom. From this time till the end of 1867 there was no decided increase nor other change in the tumour. Then a second pregnancy occurred. She began to suffer from intense pain in the tumour, and became restless and desponding. It was in the fifth month of this second pregnancy that I saw her, and found an ovarian cyst as large as an adult head above and to the right of the uterus. At that time there was no very great suffering, but I advised that the cyst should be tapped if relief was called for by any increased distress. At about the sixth month premature labour came on spontaneously, and she was delivered of a dead child. From the period of her delivery many of her symptoms subsided; she slept well, was cheerful, and the tumour was less painful. But after about a week she began to complain of more pain in the tumour, and it increased rapidly in size. Her hysterical symptoms became aggravated to a degree almost amounting to mania. Dr. Day informs me that 'the tumour, although increasing rapidly in size and becoming very tense and hard, was not so large as to render the abdominal walls very tense, or to press upon other organs so as to interfere with the performance of their functions. The pulse, which had fallen in frequency after the premature delivery, again became weak, and rose to 120. This state continued without alteration for about a week or ten days. One morning, after turning somewhat suddenly in bed, she cried out that something had broken inside, and died almost instantly. No post-mortem was made, but the abdomen was found to be perfectly flaccid. Not a trace of the tumour could be felt.'

Case 3.—On the 16th of January, 1869, I met Dr. Finch, of Blackheath, and Dr. Furley, of Malling, in consultation upon a lady, 24 years of age, who had been married about nine months. Between two and three months after marriage the catamenia ceased, she increased in size,

and considered herself pregnant. After a long drive, which shook her very much, on the 20th of November, she was seized at night with intense pain. Dr. Finch was sent for and told that abortion was threatening, but he found her suffering from a severe attack of acute peritonitis, the abdomen being greatly distended, and containing a tumour the size of the uterus at nearly the full period. There was no injection of the mammary areolæ, nor any other sign of pregnancy. The next day she was seen by a distinguished physician-accoucheur, who could not satisfy himself as to the existence of pregnancy. The acute symptoms subsided, and on the 23rd of November the physician just alluded to and another eminent physician-accoucheur, who had seen the lady some years before, met Dr. Finch in consultation.

This gentleman, although admitting some doubt, expressed himself pretty confidently as to pregnancy, on account of the soft cushiony state of the cervix uteri, seldom found in young newly married women when not pregnant. He said that he had seen the patient in 1865, who had then told him that, five years before that time, after a chill when dancing, she had felt pains which had been followed by enlargement in the left groin. A tumour, irregularly nodular, not fluctuating, and moveable, was felt in 1865, reaching nearly to the umbilicus in the centre, and nearly up to the false ribs on the left side. He then regarded the tumour as probably ovarian, and considered that it had not much enlarged since, but had become complicated with pregnancy. After this consultation the health improved, and, notwithstanding some slight symptoms of peritonitis, on several occasions she was able to walk about her room. The abdomen gradually increased in size, and at my first and only visit I could distinctly trace the boundaries of three tumours, or separable portions of one tumour—one central, extending upwards half way from the pubes to the umbilicus; one on the left side, extending into the left flank and reaching about an inch above the umbilicus; and one on the right side, extending nearly to the false ribs. The central tumour felt exactly like a pregnant uterus. The tumours to the right and left were not fluctuating, but they felt softer than fibroid tumours of the uterus usually do. The cervix uteri was shortened and softened,

strongly supporting the belief in the pregnancy. But no sound of fœtal heart nor placental murmur could be detected. To the left of the cervix, projecting towards the bladder, a hard nodulated tumour, as large as three or four walnuts, closely connected with the body of the uterus, could be felt. This, I felt sure, was a fibroid outgrowth from the uterus, and I made a diagram illustrating my diagnosis of pregnancy with a small hard fibroid outgrowth from the body of the uterus, and two softer tumours, which might be either ovarian tumours or soft uterine fibroids; and I advised that the physicians who had seen her six weeks before should see her again, and consult as to the propriety of inducing premature labour, as I did not think that tapping could lead to any considerable diminution in the size of either of the tumours.

A fortnight after this advice was given, Dr. Finch distinctly heard the fœtal heart. This was on the 29th of January. On the 8th of February, at four in the morning, after a quiet day on the 7th, free from much pain, she awoke after three hours' sleep, complained of pain, asked for fomentations of hot water, then coughed, fell back, and suddenly died. Dr. Finch adds, 'I presume, from the bursting of a large cyst, but I had no opportunity of making a post-mortem examination.'

Cases 4 and 5.—It is unnecessary to detail the particulars of these cases, the simple facts being that two patients who were pregnant had also large ovarian cysts, which I thought should be emptied by tapping, but my advice was not followed. Both women suffered excessively from distension, had lingering labours and still-born children. In both ovariotomy was performed a few weeks after delivery, successfully in one, with a fatal result in the other.

I have also notes of five cases of patients whom I have tapped during pregnancy, one of them three times, one twice, and three once. In all these women great relief was afforded by the tapping, no ill effect of any kind was observed to follow it, and in all cases the children were born alive after labours of moderate duration. One of these cases is of sufficient interest to deserve a short report.

Case 6.—In November, 1865, I performed ovariotomy with a successful result upon a married woman, 40 years of age,

four months after the birth of a living child at the full term of pregnancy. I had tapped this woman two months before her delivery. She was sent to me by Mr. Ward, of Newark, in May, 1865. He had tapped her twice, removing nearly four gallons of fluid each time. The first tapping was in April, 1864, the second in February, 1865. When I saw her first she had been married three years, and had not had a child. The catamenia became scanty about the time of her marriage, and '*got less and less till they left her*,' in November, 1864. The abdomen was greatly distended, and nothing could be detected except a very large ovarian cyst, nor could the patient believe that she was pregnant. But the cervix uteri was found to be short and velvety, and *ballottement* was very distinct. The mammary areolæ were injected, the corpuscles well developed, and a little colostrum was squeezed from the nipples. As the suffering from distension was very great and immediate relief necessary, I tapped on the 13th of May, and removed eighteen pints of fluid. The enlarged uterus was then felt nearly up to the umbilicus, the collapsed cyst to the left, and the fœtal heart was heard below and to the left of the umbilicus. Immediate relief followed the tapping. A healthy child was born on the 20th of July, at the full term of pregnancy. The patient was too weak to nurse it. The cyst refilled, and I removed it in the Samaritan Hospital on the 29th November, 1865. There were very extensive adhesions, but the patient made an excellent recovery, and had another child in September, 1867. I heard from her in November, 1869, as being quite well.

Case 7.—As I published a very full report of this case in the 'Medical Times and Gazette' of September 30th, 1865, I need not do more now than point out its bearing upon the question of the performance of ovariotomy during pregnancy. In this case I entirely overlooked the coexistence of pregnancy with ovarian disease, and after the removal of an adherent multilocular cyst of the left ovary, weighing about twenty-eight pounds, I felt what I thought was a cyst of the right ovary, tapped it, and then found that it was the gravid uterus. As this stage of the operation is of some importance in the history of the Cæsarean section, being, I believe, the first case in which the opening in the uterine wall was closed by sutures, I

quote the following passage from the report published at the time:

'Some two or three pints of bloody fluid having escaped through the canula, the tumour became much less tense; and on bringing it up to the surface I saw the Fallopian tube passing from its upper part towards the left side, and knew at once that I had punctured the uterus. On withdrawing the canula, a soft, spongy, bleeding mass protruded, and on putting in my finger to push this back and examine the uterine cavity, the anterior wall of the uterus—which was very soft and friable, as if it had undergone fatty degeneration—gave way along the middle line from the puncture (which was near the fundus) for an extent of from three to four inches down the body towards the neck. With very slight pressure a quantity of liquor amnii and a fœtus of about five months escaped. I then easily peeled off the placenta from the inner surface of the uterus. The organ did not contract, and there was free bleeding from three vessels close beneath the peritoneum at the lower angle of the rupture in the uterus. These vessels were secured by three silk ligatures. Oozing still going on from the surface where the placenta had been attached, I made a free opening into the vagina by passing my finger from above through the cervix and os, and then put a piece of ice into the uterus, and held it within by firmly grasping the organ, which then contracted. I then brought the peritoneal edges of the tear in the uterus together by an uninterrupted suture of fine silk, one long end of which I had previously passed into the uterine cavity, and out through the os into the vagina. By seven or eight points the edges were brought accurately together, and the other end of the silk was brought out through the opening in the abdominal wall with the ends of the three ligatures on the vessels in the uterine wall close to the pedicle, and were tied to the clamp.'

Any one interested in the progress of this patient after this complicated operation may find a very full report in the Journal to which I have referred. All I need say now is that the patient completely recovered. She went to the Convalescent Hospital at Eastbourne thirty-three days after operation, and I have seen her several times since in excellent health.

The interest of this case in relation to the subject under

notice is in its bearing on the question, 'What should be done when a pregnant uterus is discovered during some stage of ovariotomy?' My answer would be, 'Let it alone.' But in a case of Dr. Atlee's, in 1850, ovariotomy performed in the second month of pregnancy was 'followed by such great irritability of stomach, in consequence of the state of pregnancy, that she could not be nourished, and she died, thirty days after, of starvation.' And in a case by Mr. Burd, of Shrewsbury, in 1847, of ovariotomy performed between the third and fourth months of pregnancy, abortion took place two days after operation, and was followed by alarming symptoms, lasting several days. Still the patient recovered. So Dr. Marion Sims performed ovariotomy in the third month of pregnancy, and did not detect pregnancy until the ovarian tumour had been removed. The patient recovered well, went the full term, and was safely delivered of a fine child.

Supposing the operator has penetrated the uterus, if any conclusion can be drawn from the case in which I made this mistake and emptied the uterus, and two other cases in which the same mistake was made by other surgeons, who did not empty the uterus, but closed the puncture in its wall by wire sutures, both patients having died after aborting, while mine recovered, it would appear to be the safer practice to empty the uterus.

I now proceed to relate four other cases, in one of which ovariotomy was performed at the fourth month of pregnancy, after rupture of the cyst and peritonitis; in the second, third, and fourth the operation was a matter of election to avoid other dangers. The result was successful in all of them, the mothers being saved, three of them giving birth to living children after natural labours at the full period of pregnancy, and the fourth having recovered well after a rapid labour eleven weeks after ovariotomy.

Case 8.—The wife of an hotel-keeper, 36 years of age, mother of eight children, first consulted Mr. Bateman on the 23rd of July, 1869. About a fortnight before this an abdominal tumour, which had been slowly increasing after the birth of twins sixteen years before, and had not prevented the birth of six other children, had suddenly and rapidly increased in size after an attack of severe abdominal pain and tenderness with sickness

and fever. When Mr. Bateman was called in he considered 'the case was full of peril, for, although the abdominal tenderness was subsiding, the effusion was increasing. There was considerable difficulty of breathing on lying down, and great restlessness, with scanty and deep-coloured urine, abounding in lithates.' Mr. Bateman's diagnosis was 'ovarian tumour on the right side, ascites, pregnancy of about three months' duration, and extensive recto-vaginal protrusion.' On the 13th of August I saw the patient with Mr. Bateman by his desire, and entirely concurred in his diagnosis as to the presence of an ovarian tumour with free fluid surrounding it in the peritoneal cavity, and depressing the recto-vaginal pouch, and in the existence of pregnancy about the commencement of the fourth month. 'We also came to the conclusion' (I now quote from Mr. Bateman), 'that the fluid in the peritoneal cavity was ovarian fluid, the sudden attack of pain when I was first called in having been caused, in all probability, by the rupture of part of the wall of a multilocular cyst, and the escape of the contents of a large cyst. Pain, tenderness, raised temperature, rapid pulse, dry tongue, and sickness, all pointed to diffused peritonitis, and a condition requiring immediate relief.' On the following day I performed ovariotomy, most ably assisted by Mr. Bateman, by Dr. Jagielski, and by Professor Neugebauer, of Warsaw, Dr. Junker administering bichloride of methylene with his usual care and success. Our diagnosis was completely verified. There was general injection of the peritoneum, but no recent lymph. The only adhesion was to omentum. The tumour, with its contents and the fluid surrounding it, weighed altogether thirty-seven pounds. I was extremely careful to cleanse the peritoneal cavity completely from all ovarian fluid by repeated sponging before closing the wound.

The patient recovered perfectly well, went from London to Ramsgate twenty-eight days after the operation, and arrived there with very little fatigue. She returned in excellent health, and pregnancy has since gone on without any unusual symptom.

In the 'Lancet' of March 19th, 1870, Mr. Bateman states that this patient was safely delivered of a living child on the 18th February, after a natural labour, and went on well afterwards. But she died in 1871 of malignant disease of the uterus.

Case 9.—In this case I was acting with Mr. Goddard, of Islington, and I feel much satisfaction in reprinting his report to the Obstetrical Society, together with some of the judicious remarks with which he enriched it:—

'In August, 1869, I attended a lady, 28 years of age, in her fifth confinement. She was married in 1863, and her eldest child was born in the same year. She had one abortion in 1868. After the delivery in 1869 some fulness of the abdomen, not observed after previous confinements, was noticed, and the increase in size went on gradually. Occasional pain in the left groin and hip had been felt for the previous four years. In August, 1870, Mr. Spencer Wells saw her with me, and confirmed my opinion that an ovarian cyst of considerable size was present; but as the general health was good, and there was no very urgent symptom, we agreed to defer any consideration of surgical treatment. On the 17th of October, 1870, a regular catamenial period ceased, and symptoms of pregnancy began within a fortnight—sickness and frequent micturition, as in previous pregnancies. At the next period in November there were no signs of menstruation, and increase in size continued. On the 12th of December a second period was due and passed over, nausea and discomfort increasing with the increasing size of the abdomen.

'Taking all the circumstances of the case into careful consideration with Mr. Spencer Wells, it was agreed that he should perform ovariotomy on the 20th of December, 1870, and he did so, assisted by Dr. Legouest, of Paris, by Dr. Bantock, by my friend Dr. Shepherd, and by my father and myself. Complete anæsthesia was maintained by Dr. Day with chloro-methyl. An incision five inches long between the umbilicus and pubes exposed a non-adherent ovarian cyst, which was tapped, and one large cavity was emptied. The principal cyst was then opened, cysts broken up, and the whole tumour was drawn out without any of the contents escaping into the peritoneal cavity. A long narrow pedicle on the left side was secured in a small clamp, which was fixed outside the abdominal wall. Scarcely any blood was lost. The right ovary was healthy. The uterus appeared to be as large as a cocoa-nut, and Mr. Wells said it felt like a thin cyst, larger than he should have expected at the commencement

of the third month of pregnancy. The wound was united by silk sutures passed through the whole thickness of the abdominal wall. The fluid removed measured eleven and a half pints; the weight of the cyst and solid matter was three and a quarter pounds. Total, about fifteen pounds.

'I have little to say of the progress of the operation except that recovery was rapid and complete. The clamp was removed, and the bowels acted on the eighth day. Pregnancy went on quite unaffected by the operation, and a healthy child was born after a natural labour on the 29th of July, 1871. The lady has nursed her child, and has gone on quite as well as after any previous confinement.

'This case will serve a useful purpose if it assist us in settling the question, still *sub judice*, as to the proper treatment which should be the rule when pregnancy is complicated by ovarian disease. Dr. Barnes may be taken as the representative of those who would induce premature labour, and leave the ovarian tumour to be dealt with when the uterus has been emptied, and the patient no longer pregnant. Mr. Spencer Wells, on the other hand, represents those who would, either by tapping or by the removal of the cyst, enable pregnancy to proceed to its natural termination. We have seen the result of this practice in this case. What would have happened if premature labour had been induced?

'With a result so satisfactory, it seems vain to speculate on the effect which would have followed a different course of action. Bearing in mind for a moment the dangers besetting a patient afflicted with the double burden of pregnancy and an ovarian tumour—danger created by the unnatural distension or by the possible twisting of the pedicle, or the bursting of the tumour—it would seem at least a cruelty to subject her to a double operation if danger attach to both; and whether we induce premature labour, or whether we tap, we only postpone the day of greater trial.

'In spite of the accurate reasoning in Dr. Barnes's admirable work on "Obstetric Operations," I am tempted to think that his special skill in the induction of premature labour has made him overlook the remarkable success which has been attained in the few cases in which ovariotomy has been performed during pregnancy. He quotes, however, the case of Mr.

Spencer Wells (" Obstet. Trans.," vol. xi.), in which, the tumour having burst, gastrotomy was performed, the peritoneum cleaned out, and the patient not only recovered, but pregnancy went on to term, and the labour was perfectly natural, a living child being born. At all events, I feel justified in saying that if we look at the uncertain efforts of Nature to extricate a woman from this complication—that is to say, sometimes by spontaneous abortion, and sometimes by the bursting of the cyst—we ought not to seek to imitate her either by inducing delivery or by tapping, for, whether nature or art produce abortion, the tumour remains; whether the cyst burst or be tapped, art must still step in to save the woman's life.

'The reason why tapping was not had recourse to in this case was chiefly that peritonitis, suppuration of the cyst, or omental or parietal adhesion, would be likely to follow, for the simple reason that they do follow in *un*complicated ovarian dropsy in about 45 per cent. more cases than where the patients have not been tapped. Mr. Spencer Wells adduces five successful cases of tapping during pregnancy without any untoward result, and all the children were born alive. But I think that a very careful selection of cases for tapping must be made, because it is only in cases of single or nearly single cysts—the rarest form of ovarian disease—that tapping can be of much use. In the more common form of multilocular cysts risk would be incurred without benefit.

'The coexistence of pregnancy suggested the possible occurrence of abortion, but it seemed more likely to happen if the cyst were meddled with and not removed than if it were removed altogether.

'The reason why the induction of premature labour was not had recourse to was that already the patient was beginning to suffer constitutional disturbance from the double burden, and it was doubtful whether, by the time a viable child could be born, they would not have assumed such magnitude as to imperil her safety; and that, if abortion were induced, the child would be lost, the tumour would remain, and the condition of the patient would be anything but satisfactory; nor would it be possible to secure her against the chance of the tumour bursting during labour—an event likely enough to occur at whatever period labour might be induced.

'There is a time in most cases when the balance of circumstances favourable to operation is on the side of the patient. There is, on the other hand, a time when functional disabilities and consequent blood deterioration have done their work, and the surgeon's chances of success have proportionately diminished. This is very much more true in such a case as that under consideration. With a rapidly enlarging tumour and with pregnancy advancing, it is easy to lose the golden opportunity. And it appears that, if the tumour is of such a size as to have produced symptoms of pressure on important parts, or if it be rapidly enlarging, the state of pregnancy cannot safely be superadded to it for more than three or four months.

'The capital operation is the straightest and most certain road to safety, and we should no longer seek to find peace by temporising in indirect byways, but rather hope that the good surgeon, like the good engineer, may find his way to success through that road which, although the most secure, seems beset with the greatest obstacles.'

Case 10.—A married lady, thirty-eight years of age, mother of five children, and whose own mother had died of dropsy and some sort of abdominal tumour, was introduced to me in April, 1871, by Dr. Ross. Eighteen years ago, before her marriage, he had discovered the existence of a tumour, and observing its progress, found at each delivery that it had diminished during the pregnancy. All the deliveries were natural except one, and in that Dr. Ross turned. Soon after the birth of each child the tumour began again to increase, but never so much as within the last six months, the youngest child being eight months old. My diagnosis was, Ovarian cyst, probably dermoid, uterus free, early pregnancy; and on May 4 I performed ovariotomy.

An incision of five inches midway between the umbilicus and symphysis pubis exposed a free cyst, which was tapped. The tube was immediately plugged, no fluid escaping; and on removing it, and a mass of hair and fat, a quantity of fluid gushed away, and a cyst was drawn out, with a coil of intestine, and large shreds of adhering omentum (very vascular). On separating the omentum and intestine, I found that there was no pedicle, the blood supply of the cyst having been kept

up by the omental vessels, and some large vessels near the cæcal appendix, where the intestine appeared thick and contracted. Several vessels and shreds of omentum were tied and returned with the ligatures cut off short. The left ovary was three times its natural size, with large vesicles and opaque spots on their coats. I decided not to remove it. The uterus was large and cyst-like, and at the second month of pregnancy. The wound was closed with sutures.

The solid part of the cyst weighed about two pounds, and it contained as much as thirty-two pints of fluid. A large quantity of loose hair, with fatty matter, which became solid on cooling, was removed from the cyst. Part of the cyst wall was to the naked eye exactly like skin, and elsewhere it was inlaid with small bony plates. The recovery was uninterrupted, and in the month of December Dr. Ross wrote to me saying that the patient was delivered of a fine female child, after a labour of about thirteen hours. She went on perfectly well, and was in good health in May, 1872.

Case 11.—A married woman, twenty-nine years of age, mother of one child, was sent to me by Dr. Moore, of Ipswich, early this year, with tumour in the right side, recognised as ovarian. She was tolerably healthy, fresh-looking, but thin. The skin of the abdomen was tense and glistening, the lineæ albicantes well marked. There was tenderness on the right side, with distinct fluctuation, but no crepitus; the sounds on percussion, clear superiorly, and changing with the position; in the lumbar region dull when the patient was on her back, clear when on her side. The uterus was in its natural position, cervix moveable and soft, the os patulous. The catamenia ceased three months ago, having previously been regular and natural. The urine was clear, acid, not albuminous, but loaded with lithic acid. The general health was not much affected; pulse 100; sounds of the heart normal; and no special hereditary tendency to disease.

She first noticed the enlargement twelve months before, and attributed it to pregnancy; but from the recurrence of the menses she became doubtful, and at the end of eight months was no larger than at the third. The tumour was at first felt more in the right side, and caused neither pain nor tenderness, nor any other particular symptoms.

Within the last month she has increased rapidly, and, though pregnancy of the fourth month was discovered, the body was so tense on admission to the Samaritan Hospital, that she was tapped with the lancet and several pints of fluid removed from the peritoneal cavity. After tapping, a small hard, moveable tumour could be felt in the right iliac region, which I supposed to be the solid part of a multilocular tumour which had burst. The size of the uterus, softness of the cervix, and absence of the catamenia for three months, made pregnancy almost certain.

On March 13 I performed ovariotomy, making an incision of five inches midway between the umbilicus and symphysis pubis. About five pints of clear fluid escaped from the peritoneal cavity, and I felt the large uterus just like a tense thin cyst. To its right and above was a hard tumour, held up by omentum which adhered to it, and having the right Fallopian tube only separated from it by the broad ligament. I transfixed the ligament by a needle carrying strong silk. A large vein which was punctured bled freely, but on tightening the silk, and tying the ligament, bleeding stopped. I cut away the tumour, leaving the Fallopian tube untouched, and cut off the ends of the ligatures short. Silk ligatures were used. I did not feel either ovary ; the uterus being so large and tense, I was anxious not to disturb it. On the fifth day the wound was healed, and the stitches were removed. The patient recovered without any symptom of abortion, was delivered on May 27 of a small child after a rapid labour, and did well.

The tumour was a nearly solid mass of white fibrous tissue, infiltrated in places with a thick transparent fluid, which had here and there collected in the distended areolæ. But towards the upper part there was a large irregular cavity divided by imperfect septa, lined with smooth membrane, and nearly filled with blood clot, partially organised. The pedicle was a small double layer of peritoneum, about an inch and a half long, and a quarter of an inch wide, enclosing a few vessels and some areolar tissue. The tumour measured in its long diameter six inches and a half, and in its short diameter three inches and a half. It is referred to in the section on Fibrous Tumour of the Ovary.

Careful consideration of the cases just related will lead, I think, to the following conclusions:

1. Pregnancy and ovarian disease may go on together, and may end in the birth of a living child and the safety of the mother.

2. But in a large proportion of cases, probably in nearly all where an ovarian tumour is large, there is danger of abortion; or, if the pregnancy proceed to the full term, of lingering labour and a still-born child; and throughout the later months of pregnancy there is danger of sudden death to the mother from rupture of the cyst or rotation of its pedicle.

3. Spontaneous premature labour may not save the mother from these perils, and the induction of premature labour artificially almost implies sacrifice of the child with considerable risk to the mother.

4. There is no proof that tapping an ovarian cyst is more dangerous during pregnancy than at any other time; and if there be a large single cyst, tapping will afford immediate relief to distension at a very slight risk to the mother, and lead to the natural termination of pregnancy in the birth of a living child, if proper precautions be taken to prevent the escape of ovarian fluid into the peritoneal cavity, and the entrance of air into this cavity, and into the cavity of the cyst. In cases of multilocular cyst tapping can be of very little use.

5. In cases of multilocular cyst, or solid tumour, the rule should be to remove the tumour in an early period of pregnancy; and if an ovarian cyst should burst during pregnancy at any period, removal of the cyst and complete cleansing of the peritoneal cavity may save the life of the mother, and pregnancy may go on to the full term.

6. Of three cases on record where a pregnant uterus has been punctured during ovariotomy, the only recovery was in the one case where the uterus was emptied before the completion of the operation.

The Diagnosis of Uterine from Ovarian Tumours is a difficulty which frequently arises in practice, which may often be solved with great ease, which as often requires much cautious investigation, and which in some cases can only be cleared up by an exploratory incision.

It is only since ovariotomy has become a familiar operation

that the fact of uterine tumours frequently attaining a very large size has become generally known. Even now I am often told by men of great experience that a tumour must be ovarian because it is too large to be uterine. They have never seen nor heard of any such enlargement of the uterus, and are astonished when I say that the largest abdominal tumours I have ever seen have been fibroid or fibro-cystic tumours of the uterus.

In one of the earliest attempts to perform ovariotomy in Great Britain, in 1825, Mr. Lizars fell into this error of diagnosis. He opened the abdomen and found a large uterine tumour. And the first tumour supposed to be ovarian which was removed in London—by Dr. Granville, in 1827—proved to be a fibroid tumour of the uterus, weighing eight pounds. Of the eight first published cases by Kœberlé of removal of uterine tumours by gastrotomy, in only three was the diagnosis of uterine tumour made accurately before operation. In two the diagnosis was doubtful, and in three the tumour was believed to be ovarian. In fact it has happened to many surgeons, and to myself among the number, that we have commenced operations as ovariotomy, and even removed tumours from the abdomen, under the impression that we were dealing with diseased ovaries, when, upon examination, they have proved to be pedunculate fibroid outgrowths from the uterus.

In my first work on 'Diseases of the Ovaries,' published in 1865, I have recorded cases where I removed large uterine tumours containing solid fibroid masses many pounds in weight, and cyst-like cavities containing more than 20 pints of fluid, these tumours being so far pedunculated outgrowths from the peritoneal surface of the uterus that the mobility of the cervix uteri was free, and no enlargement of the uterine cavity could be detected by the sound.

It is quite certain, therefore, that both uterine and ovarian tumours may lead to very great enlargement of the abdomen, and I can add from my own experience that the tumours may be central in position, or inclined to one or other side; either round, ovoid, or irregular in form; smooth or lobulated on their surface; either hard, or elastic, or fluctuating; either tender or insensible to pressure; and either adhering to the abdominal wall or moving beneath it with or without crepitation.

It is also certain that there is nothing in the *history* of a doubtful case which affords any very decisive assistance in diagnosis; for although the increase of ovarian tumours is often rapid, it is almost as often slow; and if the increase of uterine tumours is generally slow, it is not unfrequently rapid. Uterine hæmorrhage, either in the form of excessive menstruation or of flooding at irregular intervals, is certainly more common in uterine than in ovarian tumours, but is occasionally associated with the latter. Probably the rule is that menstruation is scanty when a tumour is ovarian, and excessive when it is uterine, but exceptions to this rule are numerous; and discharges of albuminoid fluids from the vagina at variable intervals are common in both classes of tumours.

So with the *age* of the patient. Perhaps uterine may be more common than ovarian tumours in old persons, and ovarian more common than uterine tumours in young persons; but it is certain that both uterine and ovarian tumours are common in single, married, and widowed women at all ages after puberty, and in all conditions of life.

They are also observed in some women who are extremely fat, in some who are otherwise healthy and well-nourished, and in some who are extremely emaciated; and there is a facial expression common to women suffering from both classes of tumours, associated commonly with a very florid complexion when the tumour is uterine. In the majority of ovarian cases the complexion is pallid; but in some cases, where the patient is fat or well nourished, the complexion may be florid.

Remembering the numerous exceptions to all the rules just stated, we may now inquire what may be learned by the eye, the touch, and the ear, in an examination of the abdomen; in other words, what are the signs afforded by inspection and measurement, by palpation, and by percussion and auscultation, which are of value in diagnosis. The results of this inquiry may be arranged in the following order:

Inspection.

1. Visible enlargement of the abdomen is more often *general* in cases of ovarian tumour, and *partial* in cases of uterine tumour, being confined to the lower part of the abdomen until a very large size has been attained.

2. The depression of the umbilicus is diminished, or the umbilicus may become prominent, in large ovarian cysts. This is rarely seen in uterine tumours unless fluid is also present in the peritoneal cavity.

3. Enlargement of the superficial veins of the abdominal wall, and œdema of the abdominal wall and of the lineæ albicantes, are more general in uterine than in ovarian tumours of moderate size, but are not uncommon when ovarian tumours have attained a very large size.

4. When the abdominal wall is thin, both uterine and ovarian tumours, if not very closely adherent to the abdominal wall, may be seen to move downwards as a recumbent patient inspires, and upwards during expiration, falling downwards and forwards as she sits or stands, and more or less to either side according to the inclination of her body. But nearly all uterine tumours, though visibly moving above, seem to be fixed below in the hypogastric region.

5. When a recumbent patient attempts to sit up without aid from any other than the abdominal muscles, the recti are seen to bulge forward in front of a tense non-adherent ovarian tumour or with a flaccid adherent cyst. This is seldom well marked in uterine tumours, a solid mass fixed centrally below the umbilicus interfering with the free action of the recti.

Measurement.

6. Increase in the circular measurement of the abdomen is usually greater on one side than the other in ovarian tumours. In uterine tumours the increase is more often symmetrical. In both classes, vertical measurement shows the distance between the pubes and the sternum to be increased. But very great proportionate increase of the space from the pubes to the umbilicus is more common in uterine than in ovarian tumours.

Palpation.

7. Large masses of apparently solid matter, and smaller masses or nodules of very hard or bone-like substance, are sometimes observed in ovarian tumours. But it is excessively rare to find such solid portions *preponderating* in an ovarian tumour. As a rule, the fluid or cystic portion is the larger, the hard or

solid portion the smaller, in ovarian tumours. In uterine tumours, on the contrary, the solid is the larger, the fluid the smaller, portion.

8. The mobility of ovarian tumours is generally greater from below upwards than that of uterine tumours, unless the latter are distinctly pedunculated. If one hand be pressed backwards between the tumour and the pubes, an ovarian tumour can generally be raised considerably, and the hand can sometimes be pressed backwards almost to the brim of the pelvis; while a tumour which involves the body and neck of the uterus cannot be raised at all, or only with difficulty, and the hand cannot be pressed down between the pubes and the tumour.

9. When there is fluid free in the peritoneal cavity, and a hard tumour can be felt on displacing this fluid by sudden pressure, the tumour may be either uterine or ovarian. If the tumour be very hard and the quantity of fluid small, the tumour is probably uterine and the fluid ascitic. An ovarian tumour which has given way, and emptied one or more of its cysts into the peritoneal cavity, is seldom hard or well-defined in outline, and the quantity of fluid is often so large that the size and shape of the tumour cannot be ascertained until after removal of the fluid by tapping. The characters of the fluid will then complete the diagnosis.

Percussion.

10. As percussion elicits a dull sound all over both uterine and ovarian tumours, which dulness ceases abruptly at the border or outline of the tumour in all positions of the patient—except in the rare cases where a cyst contains gas, or where a coil of intestine is adherent in front of a tumour—percussion cannot afford much aid in distinguishing ovarian from uterine tumours.

Auscultation.

11. In ovarian tumours the impulse from the aorta is often perceptible, and a sound sometimes accompanies the impulse. The sounds of the heart are rarely transmitted, and any distinct vascular murmur is excessively rare. But in about half the cases of uterine tumours which I have examined some variety of vascular murmur may be heard. In some cases the murmur is

tubular, in others vesicular, and sometimes a tubular and a vesicular murmur may be heard in different parts of a uterine tumour. These murmurs are synchronous with the pulse. They may vary in intensity with the amount of pressure by the stethoscope, and may disappear on very firm pressure. Common in uterine, very rare in ovarian tumours, vascular murmurs are valuable aids in diagnosis.

Having thoroughly examined the abdomen, the pelvis is next to be examined by the vagina and rectum, and a conjoined examination of the tumour by the abdomen and pelvis should also be made.

Examination of the vagina may at once remove all doubt, by showing that the os and cervix uteri are in a healthy state, that the uterus is normally mobile, that its cavity is neither elongated nor shortened, and that any tumour felt through the vaginal wall is independent of the uterus. In such a case the tumour is almost certainly ovarian. On the contrary, we may find the vagina more or less completely obliterated by a solid mass, the cervix uteri gone, the os reached with difficulty, the cervical canal so closed or distorted that the sound cannot be passed, or the uterine cavity so enlarged that the sound may pass many inches beyond the normal length. Here the tumour is almost certainly uterine.

But it must be remembered that considerable peritoneal outgrowths, or large growths within the walls of the fundus or body of the uterus, have been observed, while the uterine cavity has remained unaltered in dimensions and the cervix in structure. And, on the other hand, the cervix may be drawn up out of reach, or the whole uterus may be elongated, when the connection with an ovarian tumour is close; or the lower portion of an ovarian tumour may be so moulded to the true pelvis that the uterus is pressed upwards and forwards, or flattened behind the pubes, so that the tumour and the uterus are either really or apparently inseparable from one another. Abnormal arterial impulse in the vagina and cervix uteri may be felt in both classes of tumours. But I have never felt the vascular thrill like that of varicose aneurism, occasionally felt in the lower segment of a fibroid uterus, in any ovarian tumour.

The vaginal walls may be so depressed, when there is much fluid free in the peritoneal cavity surrounding either a uterine or an ovarian tumour, as to form a vaginal rectocele. And the uterus may either remain above the brim of the pelvis if greatly enlarged, or if fixed by adhesion; or it may prolapse with the vagina, the os appearing at the most depending part of the protrusion. Here the uterine sound will generally remove all doubt; for if the dimensions of the uterine cavity are normal, and the weight of the uterus is not increased, the tumour can hardly be uterine. And a uterus which is not much enlarged can generally be pushed up to its normal position.

In some cases where the uterus is much elevated, it may be felt through the abdominal wall above the pubes, while the os uteri cannot be reached by the vagina. The urethra may be elongated or drawn to one side, and the bladder may also be displaced. If the abdominal tumour and the pelvic portion of the tumour fluctuate, while the uterus does not much exceed its normal dimensions, it is almost certain that the uterus is adherent to, and is elevated by, an ovarian tumour.

Examination by the rectum may show that the uterus preserves its normal size, shape, and position. Or it may be displaced by some tumour above or in front of it, and one or both ovaries may sometimes be felt. This, however, is not very common if they are not enlarged nor lower in the pelvis than usual. By one finger in the rectum and another in the vagina, the consistence, form, and size of any intervening structure can be ascertained and valuable information so obtained. And if the sound be passed into the uterine cavity, and examination then made by the rectum, it is often easy to ascertain whether any solid or fluid tumour is situated between a normal uterus and the rectum, or whether the uterus is fixed and its posterior part enlarged.

When a tumour can be felt in the pelvis by vagina and rectum, as well as in the abdomen by the abdominal wall, simultaneous examination will be required to ascertain if there is more than one tumour, and if the uterus is independent or not. Pressing one finger firmly on the cervix uteri, and moving the abdominal tumour with the other hand from side to side, then upwards and downwards, the uterus may be felt

to remain almost unaffected by the movements of the tumour, or only to receive some transmitted movement as the pelvic portion of the tumour moves. Here the strong probability is that the tumour is ovarian. On the other hand, every movement of the abdominal tumour may be communicated immediately to the uterus, which is felt to move in all directions with the pelvic portion of the tumour. If this portion is solid, it is almost certain that the tumour is uterine.

Cases are sometimes met with where ovarian tumours and fibroid tumours of the uterus are both present at the same time. Small uterine fibroids are often observed when the only important tumour is ovarian. I have seen a large cyst of one ovary and a large uterine fibroid coexisting. I have twice seen tumours of both ovaries present when the uterus was enlarged by fibroids, and several cases where both uterus and ovaries were simultaneously affected by malignant disease.

If these possible complications be borne in mind, such an examination as I have suggested will in most cases suffice to establish an accurate diagnosis between uterine and ovarian tumours. In some cases doubt may still remain, and exploratory puncture or incision may then be necessary.

One which I saw in 1862, in consultation with Dr. Madge, and in which the practical difficulties were supposed to be due to the presence of an ovarian cyst, shows how almost impossible it is under certain circumstances, even with the most experienced assistance, to form an absolutely right opinion about these suspiciously situated fibroid tumours. The particulars were laid before the Obstetrical Society by Dr. Madge, and I quote portions of his report.

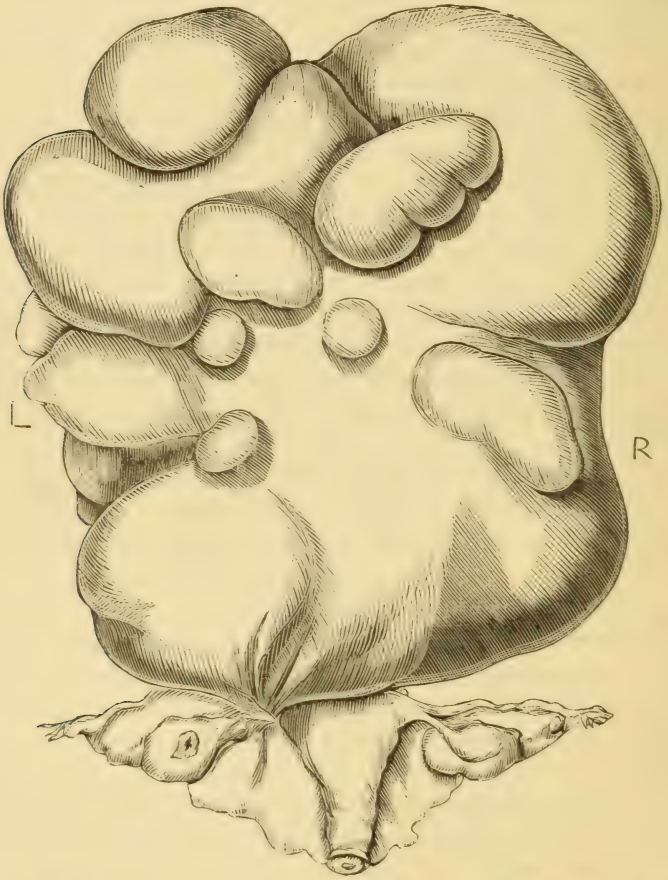
'Mrs. H., æt. 27, primipara, well-grown, in robust health, and who had gone her full time, was taken with slight labour pains on the morning of May 21. On making an examination in the after part of the day, I found the pelvis occupied by a large round tumour, which at first appeared to me to be the child's head. It seemed, however, to be lifting up, as it were, and pushing forwards the posterior wall of the vagina. It was low down, and came lower, but receding again, with every pain. It appeared to fill up every niche in the pelvis, so that the finger could not be passed around it. The os uteri could not be felt. Next day the tumour was occupying precisely the

same position. The pains were still slight and not frequent, and, as the patient was in her usual health and spirits, it was considered advisable to wait. In the evening, with considerable difficulty, by hooking my finger high up behind the symphysis pubis, I was enabled to reach the os uteri; it was directed forwards, dilated to about the size of a crown piece, and as well as I could make out, some part of the breech presented. On the following day Dr. West, Mr. Spencer Wells, and Mr. Newton met me in consultation. Pains getting more frequent. As some parts of the tumour felt soft and yielding, a trocar was introduced, and a small portion of fluid drawn off. Vain attempts had been made previously to push the tumour above the brim of the pelvis. Chloroform having been administered, and the catheter used, the opening in the tumour was enlarged. Mr. Spencer Wells was then enabled to push the tumour upwards, and, with the aid of a blunt hook, the child was brought down by the buttock. When born it had some faint signs of life, but could not be made to breathe. In the early part of the following day the patient seemed to be doing well; as the day advanced, by fits and starts she became very excited, and could not be persuaded to lie still. Peritonitis set in in the afternoon, and she died on the third day after confinement.

'*Autopsy, eighteen hours after death.*—There was a little effused lymph; and underneath the viscera about a pint of bloody serum. The tumour was lying above and in a line with the uterus, nearly reaching by its upper border the epigastrium. It was attached to the posterior aspect of the fundus uteri by a long pedicle, and had thus been allowed to drop into the pelvis at or before the commencement of labour. The weight of the tumour was between one and two pounds, its diameter six inches and a-half, and it consisted throughout of white fibrous tissue. Six small tumours, of the same character, were studded about the external surface of the uterus.'

On April 7th, 1869, I exhibited at a meeting of the Obstetrical Society a fibroid outgrowth from the fundus uteri, weighing thirty-four pounds and ten ounces, which I had removed a few hours before from a single woman thirty-six years old. Eleven years before, half her lower jaw had been removed with a fibrous tumour by Mr. Pemberton of Birmingham. An abdominal tumour was discovered in 1864; it enlarged gradually,

and she was twice in the Birmingham Hospital. During the last six months the tumour had increased rapidly, and she became very weak and lost flesh. On admission to the Samaritan Hospital a very large abdominal tumour could be felt, but it evidently contained no cyst large enough to warrant tapping, and did not feel so hard as a fibroid tumour of the uterus. No vascular murmur was audible in it, and it appeared to move quite independently of a uterus of normal size. When the tumour was exposed I was surprised to find that it was not ovarian. It sprang from the posterior surface of the fundus



uteri by a short pedicle, as shown in the above drawing to scale by Dr. Junker, which represents the posterior surface of the

uterus, with the Fallopian tubes, and both ovaries. A ruptured Graafian vesicle is seen on the left ovary. The pedicle was secured by a clamp forceps and the tumour was cut away. Some bleeding spots where adhesions had been separated were secured by an acupressure needle, and the clamp was removed. Bleeding vessels were secured by harelip pins and twisted sutures, which also served to fix the bleeding surface to the abdominal wall by transfixion. The patient died on the third day after the operation, not from any bleeding, peritonitis, or other direct consequence of the operation, but from fibrinous deposit in the right side of the heart. Superfibrination of the blood had been feared from the first on account of the rise in the temperature of the body from 98·4° to 101° within twelve hours, and then rapidly upwards to 105·8°. This was accompanied by hurried breathing, and feeble quick pulse, with scanty secretion of urine, charged with urates and pigments. The first sound of the heart became feeble more than twenty-four hours before death, and was inaudible for fully twelve hours. In all operations where peritonitis may be expected, the direct effects are far less serious than its tendency to cause excess of fibrine in the blood and separation of the fibrine in the heart.

Dr. Braxton Hicks reported of the tumour that 'it weighed thirty-four pounds ten ounces, was about 17 inches in diameter, of a nearly globular form, having five principal lobules on its upper aspect. These lobules were about three inches in diameter, and were partially pedunculated.

'The tension of the tumour varied throughout. It had a fluctuation very similar to that of an ovarian polycystic growth, which it also resembled much in appearance.

'The interior was found to be free from cysts, excepting a few of small size, of a false kind, formed by separation of the layers of the tissues, the largest not an inch in diameter, of irregular form. The tissue of which it was composed was arranged in a manner concentric with the true centre, except in the lobules, where it was arranged around their centre—differing from the irregularly concentric arrangement generally found in mural uterine fibroid growths. When cut into, serum exuded rather freely. The inside of the growth was of a pink, semi-translucent colour.

'The microscopical examination of the growth showed it to

be composed of areolar wavy tissue, interlacing in all directions, but the arrangement of the fibres was very open, and between them the serum was held; very little, if any, true uterine fibres existed.'

The subjoined case of fibro-cystic tumour of the uterus, with remarks reprinted from the 'Dublin Quarterly Journal of Medical Science,' August, 1864, independently of their practical importance, are historically interesting as a sort of landmark indicating one stage in the settling of the principles of our diagnosis in these diseases, and the date at which it became generally known that fibro-cystic tumours of the uterus could contain so large a quantity of fluid as to bring them into diagnostic competition with ovarian cysts. It also served as a danger signal, marking the limits of safety in any operative proceedings undertaken either for determining the nature of the growth or the possibility of its removal.

On June 20th, 1864, I arrived in Dublin, having been requested by Dr. Stokes to come prepared to operate in a case which he and Dr. Beatty considered did not admit of delay. I saw the patient at once with Dr. Stokes. She was a single lady, forty-five years of age, extremely emaciated, but in excellent spirits. Dr. Stokes had detected two apparently solid tumours in the abdomen ten years before. One appeared to be central, and a little above the umbilicus. The other to the right side, under the anterior superior spinous process of the ilium. They were then each about the size of a goose egg. Increase had been slow at first, and no alteration in dress had been called for until a year ago. During the past two months increase had been very rapid. The abdomen was enormously distended, measuring fifty-six inches in girth at the level of the umbilicus, nineteen inches from the ensiform cartilage to the umbilicus, sixteen from umbilicus to symphysis pubis, twenty-three from the right anterior superior spine of the ilium to the umbilicus, and nineteen inches from the same process on the left side to the umbilicus. The greater prominence on the right side was very visible; the skin covering the umbilicus was distended by fluid simulating an umbilical hernia. Above the umbilicus fluctuation was very evident: but the fluid was evidently free in the peritoneal cavity, and covered a solid or semi-solid tumour that could be felt on displacing the fluid by deep pressure. Some

of the superficial abdominal veins were dilated, but were not varicose; the fluctuation below the umbilicus was very indistinct, and the tumour appeared to be adherent. Examination *per vaginam* showed the uterus was high, but central; the os virginal; the cervix absorbed or atrophied, and behind it a small portion of the tumour could be felt through the vaginal wall. The uterine sound passed to three and a half inches. Menstruation had passed off quite naturally early in June; but there had been no appearance for the previous six months. Up to that time she had been quite regular. There was no history either of excess or deficiency. The left leg was slightly œdematous, and she had occasionally felt it weak and painful. She had never been tapped.

The diagnosis which I made and wrote down was:—'A quantity of fluid free in the peritoneal cavity above the umbilicus—ascitic or ovarian? Below the umbilicus a large attached multilocular cyst.' In consultation with Drs. Beatty, Gordon, and Stokes, it was agreed that I should tap above the umbilicus, and if the tumour appeared to be firmly adherent do no more; but if the tumour was not attached, to remove it. Accordingly, Mr. Macnamara having administered chloroform, and with the kind and able assistance of Drs. Beatty and Gordon, I tapped, with a very long trocar, above the umbilicus, and removed about thirty pints of clear rather viscid fluid. When all the fluid had escaped, the canula (which is fourteen inches long) was passed in all directions between the surface of the tumour and the abdominal wall, proving that there were no adhesions within reach. Fluctuation was also detected in different parts of the tumour. After removing the canula, and closing the small opening, I made an incision below the umbilicus about six inches long, and exposed what appeared to be two ovarian cysts separated by a deep fissure. I tapped that on the left side, and about ten pints of bloody serum escaped; two or three pints more of similar red fluid escaped after puncturing again within the cyst first opened, by pushing on the trocar without removing the canula. The tumour was then withdrawn, and found to have two attachments—one above to the tumour on the right side, and one below to the uterus. The former attachment was broken through, and two bleeding vessels on the torn surface of the

right tumour were secured by silk ligatures. The left broad ligament was then transfixed, tied in two halves with strong silk, and the tumour was cut away. It then became a question what should be done with the tumour on the right side; and, looking to its great size, solidity, evident close connexion with the transverse colon, and with the omentum which contained some enormously distended veins, it was decided, with the full concurrence of Drs. Beatty and Gordon and Mr. Macnamara, that no attempt to remove this tumour should be made, especially as the patient was becoming very feeble. The wound was accordingly closed, and the patient placed in bed. She was extremely feeble, and brandy was administered freely; but she never rallied nor recovered consciousness, continued to sink, and died about three hours after she had begun to take chloroform.

The following description of the tumour which I removed is the report of Dr. Ritchie, who examined it with great care twenty-four hours after removal:—

'The tumour is an irregularly flattened oval, weighing about twenty pounds, and composed almost entirely of solid matter. Its greatest length is 18 inches; breadth, 12 inches; thickness, 7·8 inches. For purposes of description it may be divided into an anterior and posterior surface, a right and left side, and an upper and lower extremity; but it must be remembered that its position before removal was oblique, the posterior surface being turned considerably to the left side of the body.

'The posterior surface is comparatively smooth and flat, of a dull gray colour, marked here and there with crimson traces of inflammation. It is entirely invested with peritoneum, and through that layer shines a fibrous tissue which, in the centre of the tumour, forms a dense network, but towards the superior extremity is arranged in open meshes, some of them one inch in diameter. Inferiorly the surface loses the glistening appearance which its upper portion presents, and is of that dull gray colour so characteristic of the presence of adipose tissue.

'The general shape of the posterior surface is that of the body of a guitar: and from the narrow constricted part hangs, on each side, a semi-detached tumour, that on the right side being about the size of a small orange; that on the left four or five times as large, and more irregular in shape. Imme-

diately above the irregular tumour is to be found the pavilion of the Fallopian tube (left), which runs downwards a distance of $6\frac{1}{2}$ inches, and is lost on the surface of the tumour—at least it was impossible to follow it farther. Just before breaking up into its terminal fimbriæ the Fallopian tube dilates into a transparent cyst the size of a small bean; this cyst does not communicate with, nor obstruct the canal of the tube.

'The anterior surface, which looks also somewhat to the right, is much more irregular than the posterior, and is covered with several layers of false membrane, which are deeply injected, and in some places quite black. Inferiorly, and a little to the left, is the spot at which the tumour was amputated—an irregular surface, consisting of two circular facets, about $3\frac{1}{2}$ inches in diameter, joined by a bridge 2 inches long by $\frac{3}{4}$ broad. Below, and to the outer side of the cut surface, is found the left ovarian ligament, about 3 inches long, and terminating, without any well-marked line of separation, in an ovary which, although flattened and drawn out, appears normal, and contains a corpus luteum. The superior extremity of the tumour is convex, and consists of a large cyst whose contents have been evacuated. The inferior extremity is rounded off, and presents nothing worthy of remark.

'*Structure of the Tumour.*—On making a longitudinal section the tumour was found to consist of fibrous tissue, arranged in different fashions and in different states of perfection, and split up by little cavities of various sizes, containing serum more or less transparent. In some places the fibrous tissue was arranged in concentric lamellæ, and it was then possible to isolate, by the fingers alone, little masses varying in size from that of a nut to that of an apple, and resembling much the round fibroids of the uterus. These little masses, however, were never removed entirely whole; their connexion with the surrounding tissue was much more intimate than it is usually in a uterine fibroid. In other places the fibres were interwoven without definite arrangement; towards the inferior extremity they seemed to be in process of fatty degeneration, and in several places little calcareous masses, without any well-defined structure, were discovered. Just at the inferior extremity the surface was rendered irregular by some little hard nodules, which, on being cut into, presented the appearance of tubercle.

The solid tissue was everywhere permeated by large blood-vessels, and in several places blood-cysts, the size of a barley-corn to that of a pea, were demonstrated. The largest cyst was at the superior extremity; it was about the size of an adult head, and its internal surface presented traces of having primarily been divided into several compartments. The thinnest part of the cyst wall was $\frac{1}{4}$ inch; its lining was smooth and glistening, having much the appearance of a serous layer. At one point there projected into the cavity a yellow nodule the size of a bean, and spherical in shape. With a little trouble this nodule was taken away entire, and found to consist of a smooth investing fibrous capsule, and contents which were partly granular, partly oil globules. From the large cyst a little passage, through which might be passed a common lead pencil, led down into the little tumour which was described as attached to the right side of the tumour. The corresponding one on the opposite side was also hollowed, but had no communication with the large cyst. The cysts contained in the solid substance of the tumour were of various sizes, from a mere trace to several inches in length; their lining membrane could not be separated from the surrounding tissue; some of them communicated together by means of slender tubules.'

The body was examined after death by Dr. Gordon, and the following is a description of the tumour which we did not attempt to remove:—It consisted partly of a cyst and partly of a fibro-cystic tumour. The cyst was spherical, about a foot in diameter, empty (its contents having escaped through a smooth-margined opening, an inch in length), and it adhered to the anterior abdominal wall; with this exception, the whole surface of the cyst was free and unattached, except inferiorly. The walls were extremely thin superiorly, so that at first sight they appeared to consist exclusively of peritoneum, marked, however, by the course of large vessels. Inferiorly the cyst wall was capable of being split up into three layers, the outer serous, the middle one apparently muscular, and the internal one epitheliated. A little to the right, and inferiorly, the tumour was attached by a pedicle, $3\frac{1}{2}$ inches long, 2 inches broad, and $\frac{3}{4}$-inch thick.

This pedicle was covered with a serous layer, and consisted of fibrous tissue, hollowed out here and there into little cysts,

similar to those described as having been seen in the tumour removed by operation. The extremity of the pedicle had been connected with the anterior portion of the solid tumour, but was detached by the weight of the latter, when being taken out of the body. The cyst, at the operation, was seen collapsed, and lay immediately above the transverse colon, in front of which the pedicle descended. The inferior border of the cyst was further attached to the transverse colon by strong adhesions, in which were found several large blood-vessels and some lymphatic glands; two of the latter being enlarged and infiltrated with tubercle.

A part of the omentum was attached to the colon, and in it the veins were enormously distended and much convoluted. They were full of air, and resembled rather the small intestines of a fowl or of a rabbit than the blood-vessels of a human being.

On examining the uterus and the enormous fibro-cystic tumour which was springing from its fundus, the vaginal portion of the uterus was found to be altogether atrophied—the vagina terminating in a virginal os uteri; and the sensation conveyed to the finger was that of a very light moveable uterus. On looking for the body of womb, its place was found to be occupied by a long flexible tube, crackling under pressure, like thick parchment. From the upper, somewhat dilated, extremity of this tube, sprang the right Fallopian tube and the right ovarian ligament. This was in normal relation to the right ovary, which also appeared healthy. The vagina and the elongated uterus were now slit open, and the length of the entire cavity of the womb was found to be 7 inches, that of the cervix alone $3\frac{3}{4}$ inches. The greatest width of the uterine cavity was close to the fundus, and did not exceed $\frac{3}{4}$ of an inch. The left Fallopian tube had been cut through half an inch from its uterine extremity.

The walls of the uterus, like the Fallopian tube, were of normal thickness. From the fundus sprang a fibrous column, 5 inches long, 3 inches deep, and $1\frac{1}{2}$ inch broad, encircled at its upper extremity by a ligature. The left side of this fibrous column presented a roughly cut surface, 5 inches long and 3 inches broad or deep, being the point at which the tumour first described had been cut through at the operation. The tumour which was left was an enormous mass, 18 inches in length, 16

inches in breadth, and near its centre fully 7 inches thick. The posterior surface was of a greenish colour, from commencing decomposition, and its smooth external glistening tunic here and there raised by rounded projections, of all sizes, from the head of a pin to that of a child. Some of these projections evidently contained fluids, others were hard, and their fibrous nature sufficiently apparent without the aid of dissection.

Here and there were traces of adhesions. On the anterior surface the walls were intensely congested with occasional rounded projections. The lower two-thirds of the tumour were, however, separated by a deep sulcus from its upper third, so that the two bodies appeared distinctly separate. The upper tumour was 11 inches broad by 6 inches long, and 6 inches in depth; its general shape strongly suggestive of an enlarged liver. In structure the tumour was precisely similar to the one removed by operation, and described by Dr. Ritchie.

It must not be forgotten that the above account of this case and the following remarks were published in 1864. 'One of the soundest objections raised to the admission of ovariotomy among those surgical operations which have been generally looked upon as "legitimate"—(or, in other words, which it is the duty of the surgeon to perform if he is called upon to try and save the life of a patient when threatened by a dangerous disease)—is the difficulty of diagnosis. And the supporters of the operation, while they assert that many of the mistakes which have brought discredit on surgery ought not to be repeated at the present day—and can only be repeated by the ignorant or the careless—admit that, in some rare cases, it must be almost impossible to arrive at a perfectly correct diagnosis before the commencement of the operation. Still advancing knowledge makes such exceptions rarer and rarer; and it seems probable that even such cases as that described will soon be eliminated from the list of those in which an exploratory incision must be made, or the operation of ovariotomy commenced, before the surgeon can be positively sure as to the precise nature of the growth with which he has to deal.

'In the fourteenth volume of the "Transactions of the Pathological Society of London," p. 204, may be found a short account of a fibro-cystic tumour of the uterus which I removed from a single lady, aged fifty-three, on April 30,

1863. One large cyst had held 26 pints of fluid and 4 pounds of fibrine; and a solid mass, which weighed more than 16 pounds, resembled very closely the mass just described by Dr. Ritchie. The patient sank, from shock, four hours after operation, although the tumour was completely removed; and there was so little difference in the pedicle from that often seen in ovariotomy that it was not until after post-mortem examination that the true nature of the case was discovered. Given, a large semi-solid tumour, fluctuating in some parts, containing cysts holding upwards of twenty pints of fluid, moving beneath the abdominal wall, the uterus being moveable, and not enlarged so far as measurement by the sound can detect, no sound or arterial impulse to be heard which is not often heard in ovarian tumours, and no history of hæmorrhage leading to a suspicion of uterine disease—and it will be admitted that these characters of the two fibro-cystic tumours of the uterus which I removed so closely resemble those of semi-solid ovarian tumours, that diagnosis must be very uncertain. Even after an exploratory incision, I know of nothing but a rather darker—less pearly blue—aspect of the tumour which would put the surgeon on his guard. In any doubtful case it would be well to tap the largest cyst and examine the fluid. In both my cases this was peculiar—not the viscid mucoid fluid of multilocular ovarian cysts, but a thin serum, with five, ten, or fifteen per cent. of blood intimately mixed with it, and not separating until after standing for some hours. In this way I have satisfied myself, in at least four cases, that tumours, which others considered to be ovarian, were really fibro-cystic uterine growths. If the operation has been commenced, and the dark aspect of the tumour is observed, it would certainly be advisable not to do more than tap one or more of the largest cysts before examining attentively the connections between the uterus and the tumour. If these should prove to be very intimate, it will be the unpleasant duty of the surgeon to desist from any attempt to do more, and to close the wound as soon as possible.'

After eight years' further experience I may now add, that the first two cases in which I made the attempt to do more convinced me that I tried to do what is inconsistent with a fair and reasonable hope of saving life. When a uterine tumour

is pedunculate, or can be separated from the principal part of the uterus, or when the whole of the fundus and body of the uterus, with or without the ovaries, can be removed, leaving the cervix and its vaginal attachment uninjured, the operative question is a different one, and recent experience is leading to a more encouraging view of the surgical treatment of such cases.

Diagnosis of Ovarian from Renal Cysts and Tumours.

The diagnosis of ovarian tumours from cystic growths and enlargements of the kidneys is made repeatedly, in hospital and private practice, with a readiness and certainty which render a mistake quite an exception in a large number of accurate opinions. But exceptions still occur; and men of great experience must occasionally admit that an exact diagnosis is impossible. In other cases, it is only after an exploratory or incomplete operation, or after the death of the patient, that a mistake is discovered, and the means of avoiding it for the future are learned.

The first case of the kind which came under my care was one of

Soft Cancer of the Right Kidney in a girl only four years

old. She was sent up from the country to me, in 1862, supposed to be suffering from ovarian disease. Her appearance is very well shown in the woodcut on the opposite page, copied from a photograph, taken by Dr. Wright whilst she was in the Samaritan Hospital.

The diagnosis in this case was made without much difficulty, although the urine was quite normal. The growth was extremely rapid; hardly six months from its commencement to its fatal termination—when the diseased mass weighed between sixteen and seventeen pounds. The tumour occupied the whole of the right side of the abdomen, bulging backwards in the right loin. It was uniformly elastic, but no fluctuation could be detected. The intestines were pushed downwards, and to the left side. The rapid growth, and the absence of fluctuation, were, of course, strongly against the opinion that the tumour was ovarian; while the rarity of ovarian disease in young children, and the comparative frequency of renal encephaloid, led to a diagnosis which was confirmed by a puncture with a fine exploring needle. A few drops of reddish serum were obtained, containing nucleated cells of varied size and shape. I sent the child home, with a note to Dr. Williamson, of Nantwich, expressing my opinion that the tumour was a mass of soft cancer, and that the right kidney was the most probable seat of the disease. This proved to be correct. Dr. Williamson sent me the specimen, and I exhibited it at the Pathological Society, in December, 1862. The whole kidney was infiltrated with encephaloid. Although so enormously enlarged, the shape of a normal kidney was distinctly preserved. Its surface was soft and elastic, in some spots giving a sense of deep-seated fluctuation; but no cyst was found, nor were there any marks of suppuration or hæmorrhage. Coils of small intestine adhered to its inner and under surface. The ureter was completely occluded by the pressure of the tumour. The left kidney was quite healthy. Thus the normal condition of the urine was explained. The diseased kidney added nothing to the contents of the bladder, and the healthy kidney supplied only normal urine.

The following remarks on this point by Dr. Roberts, of Manchester (*Urinary and Renal Diseases*, p. 444), are well worthy of serious consideration. He says:—'The presence of cancer

cells in the urine is a sign which usually figures prominently in the catalogue of symptoms of renal cancer, but its value is very doubtful. In all the later cases, especially where there was hæmaturia, the urine was carefully examined for cancer cells, but without success. Rosenstein mentions a case in which a cancerous villus was actually found projecting into the ureter, yet no cancer cells could be detected in the urine during life. It is by no means an easy matter to identify cancer cells in the urine, in consequence of their similarity to the transitional epithelium of the pelvis and ureter. . . . In two examples of renal cancer, with hæmaturia, which I have had an opportunity of observing, repeated and careful examination of the urine failed to discover the presence of cancer cells. Mr. Moore (*Med. Chir. Trans.*, xxxv. 466) believes that he succeeded in identifying cancer cells in the urine drawn after death from the bladder of a man in whose kidneys cancerous nodules were found; but his description rather accords with the appearance of the epithelial cells which are always freely detached from the vesical mucous membrane after death.'

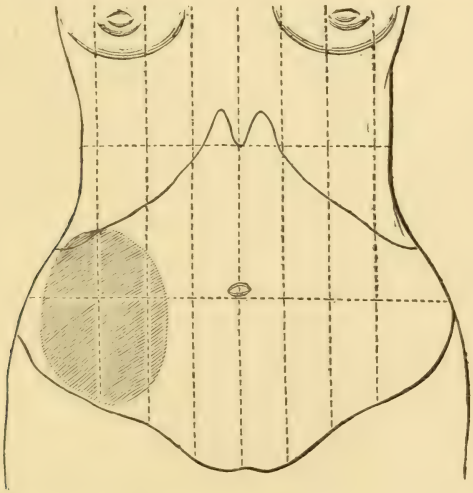
Whether renal cancer be observed in children or in adults—whether it be or be not accompanied by hæmaturia, or by the presence in the urine of albumen, or of epithelial cells from the ureter and pelvis of the kidney—whether the progress of the disease be slow or rapid—whether there may be much, little, or no pain, or emaciation, or gastric symptoms—or great or little effect upon the general health—the abdominal tumour is the most prominent characteristic of the disease. As Bright observed (*Abdominal Tumours*—Sydenham Society's Edit., p. 199):—'The enlargement shows itself much more towards the anterior part of the abdomen than towards the loins.' It is, however, more or less confined to one side of the abdomen and to the corresponding lumbar region, whence, as a rule, it is immoveable—and equally, as a rule, some portion of the intestines are fixed in front of it. But in one extraordinary case an exception was found to both these rules. In the 'Lancet' of March 18, 1865, a case is recorded in which an operation was commenced for the removal of a supposed tumour of the left ovary. The patient was in one of our general hospitals, and it was believed by the eminent physician-accoucheur who carefully examined her, and by the skilful surgeon who performed

the operation, that 'the tumour was ovarian, and that from its great mobility, and the absence of adhesions, its removal would be easy.' Yet the uterus and ovaries were found to be healthy, and the tumour to be the enlarged left kidney; which, instead of being fixed, was moveable—its peritoneal covering being elongated into a sort of mesentery, admitting of free movements—and instead of pushing the intestines before it, the descending colon and sigmoid flexure were behind it. This enlargement of a moveable kidney added greatly to the difficulty of diagnosis. A moveable kidney not enlarged could hardly be mistaken for an ovarian tumour.

The *absence of fluctuation* is the leading sign by which cancerous or other *solid* tumours of the kidneys are distinguished from ovarian tumours; for it is extremely rare to find a large ovarian tumour in some part of which fluctuation cannot be detected. But in some forms of kidney disease fluctuation is as evident as in ovarian cysts. It was perceptible in the following case of

Pyonephrosis of the Right Kidney, with Impaction of Two Calculi in the Ureter.

On May 16, 1865, I was hurriedly called to see the mother of a patient upon whom I had performed ovariotomy successfully, the daughter telling me that her mother had a tumour



like that which I had removed from herself. I found the patient in excessive pain all over the abdomen, but greater on the right side and in the right loin; and I felt a hard tumour between the right false ribs and the right ilium, reaching forward to within an inch or two of the umbilicus, as shown in the diagram on page 205.

The patient was so ill that I could not get any sort of history from her. I prescribed a full opiate, and directed it to be repeated in smaller doses at intervals of an hour until the pain abated—hot poultices being also applied. On the next day she was much easier, and I gathered the following history.

She was fifty years of age; had married when twenty-two; had borne five children. Her last child was seventeen years old. Before the last confinement her health had been very good. This labour was very protracted, the presentation having been transverse. Ever since, she had been subject at times to pain in the back and right loin. It used to come on suddenly, increase in violence, and produce shivering and nausea. After six or eight hours it would cease. Her urine at the time of the attacks was usually thick, with a yellowish sediment; at other times it was clear. For five years such attacks recurred pretty regularly every six weeks. Then, after a more active life, they recurred more frequently, scarcely a week intervening from one to another. In 1860 the catamenia ceased, and the attacks became milder and less frequent, and she was entirely free for a year or more. In 1862 the pains suddenly recurred with more violence than ever. After great suffering for several hours 'a dozen or two of little stones, as large as a pin's head,' were passed with the urine. From this time till the present attack she had been quite well. On May 8th, 1865, while out walking, she stumbled and fell upon her abdomen. She was lifted up, complaining of great abdominal pain. She got home, went to bed, and next day the pain was so great that she was unable to get up. During the next six days she passed a good deal of blood in the urine, and she perceived, for the first time, a tumour as large as a cricket ball in the right side of the abdomen. On the 15th the pain, which had almost ceased, returned suddenly with great violence, and I was sent for. She was much relieved by the opiate prescribed; and I made a more careful examination of the tumour. It could be felt as shown

in the diagram, but its margins could not be made out very distinctly. They appeared to be overlapped, on the right by the cæcum, and the left by small intestine. Wherever the tumour could be distinctly felt, it gave a dull note on moderately strong percussion, but a clear one on deeper pressure and sharper percussion. By pressure forwards with one hand on the right loin, while the other was on the front of the tumour, a trace of fluctuation was detected. Pain was kept in check by opiates, and on May 19th there was a prominent point near the middle of the tumour. Fluctuation being distinct, I inserted a very fine trocar at this point (which was midway between the umbilicus and right anterior superior spine of the ilium), and drew off between two and three pints of thin pus, by a syringe attached to the canula by an air-tight joint. The urine, before the tapping, had been clear, but the day after it was found by Dr. De Mussy to be loaded with pus. On the 21st the late Dr. Ritchie reported that it contained a large quantity of pus altered by the action of the urine. On the 27th, notwithstanding this escape of pus through the bladder, the tumour was as large as before the tapping. I therefore tapped again, and after removing two pints of pus, left the wound unclosed. There being no discharge after two days, I inserted a laminaria tent, having re-opened the wound with the lancet.

A very free discharge went on for the next fortnight. At first it was purulent, but afterwards it consisted of clear fluid, which was found to contain urea by Dr. Leared. The pain ceased, and the general health rapidly improved. The urine became clear and free from pus. On the night of June 17th some abdominal pain came on, but soon subsided, and the discharge from the opening suddenly ceased. Urine was passed with smarting, and was again found to contain pus, mingled with a little blood. Early in the morning of June 20th great desire was felt to pass water. After much difficulty and pain a calculus of uric acid and urate of ammonia, as large as a broad bean, and much of the same shape, was passed, and was soon followed by a second, of similar dimensions. Relief was immediate. On the 25th a boil was felt just at the seat of the former punctures. On the 27th it burst, discharging about two ounces of grumous matter. The patient now felt so well that she was able to walk about and enjoy herself in the country.

On the 1st of July there was still a little discharge, perhaps one ounce in twenty-four hours. The abdomen was everywhere clear on percussion; but on deep pressure a hard painless tumour, as large as an orange, was to be felt in the right loin. After a few weeks this could no longer be felt, and the patient has since remained perfectly well. I heard of her in December, 1866, as being in better health than she had been for years, and she is still well in 1872.

This case is in many respects very instructive. The patient probably had a tendency to deposit uric acid before her last labour. The effects of that protracted labour perhaps led to the train of symptoms which ended, for a time, in the passage of numerous small calculi. Then, in 1863 or 1864, two renal calculi began to form, and set up chronic pyelitis. The fall in 1865 dislodged the calculi, and they blocked up the ureter. The pus and urine accumulated behind the calculi, and distended the pelvis of the kidney into the cavity from which I removed the large quantity of pus at the first tapping; and it was not till the calculi passed on into the bladder and left the ureter free that the formation of pus ceased and the artificial opening closed.

I have twice opened peri-renal abscesses in the loin, and in one case removed a small renal calculus through the opening. But the case just related is the only one in which I have punctured the kidney through the abdominal wall. It was clearly a hazardous proceeding, but the danger of rupture of the rapidly increasing sac into the peritoneal cavity appeared to be so great, and the suffering was so excessive, that tapping seemed to be less dangerous than expectation.

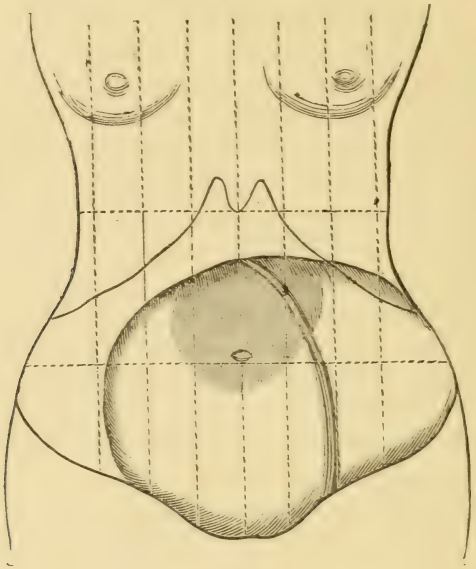
The following case of *Cystic Degeneration of the Left Kidney*, which was mistaken for a cyst of the left ovary, is not less instructive :—

On October 10th, 1866, a married woman, forty-three years of age, called upon me with a letter from Dr. M'Donnell, of Stoke Newington, containing a very full and accurate history of her case. She had been married twenty-five years, and had nine children, the eldest being 23 and the youngest four years old. She had also had one premature birth, and two abortions; the last in 1861. Dr. M'Donnell wrote as follows :—'In April, 1862, she sought my advice for a hard swelling situated in the

hypogastric and left iliac regions, the size of an infant's head. Examination externally, and *per vaginam*, convinced me it was an ovarian tumour. Mr. Solly confirmed this opinion on May 8th, 1863. In 1854 and 1855 a swelling was complained of, and had been the subject of conversation between husband and wife, but no advice was asked for at the time. Its situation was much as in 1863. Aching pain was felt, from time to time, in the tumour without causing any alarm, from the time when it was first noticed by the patient herself. It had increased so much in the early part of 1863 as to suggest the question of pregnancy. Some pain has at times been complained of in the lumbar region, and lower part of the abdomen, relieved by leeches, fomentations, &c. Leeches have been applied several times, the first time in November, 1863. In the summer of 1863 the patient began to attend the Hospital for Women in Soho Square, and became an in-patient in January, 1866, with a view to operation, but no operation was performed. She remained in hospital twelve weeks, her general health being then very bad, and she was much reduced in flesh and strength. After she left the hospital the tumour increased in size, extended to the epigastrium, and encroached so much on the chest as greatly to impede the breathing, and even prevent her moving about in bed. Assisted by Mr. Forman, of Stoke Newington, on August 4th, 1866, I withdrew, by tapping in the linea alba, two gallons of dark discoloured fluid, of the consistence of pea-soup. The opening was made midway between umbilicus and pubes. The operation was well borne ; the abdomen was entirely freed from fluid, the resonance being tympanitic everywhere, and no solid tumour to be felt in the pelvis. She recovered very favourably, and has been frequently out of doors since that time. The appetite, which had been entirely wanting for months previously, became for a short time very good. Her strength and spirits have much improved, though the cyst has re-filled.'

It was rather more than two months after this tapping when I first saw the patient, and I then advised her to come into hospital before she became as much distressed as she had been before the tapping. She was admitted on December 17th, 1866. The tumour then occupied the position shown in the annexed diagram. At the upper and central part there was a

patch of crepitus, giving the feeling of adhering omentum; and all down the front of the tumour, about an inch to the left of the umbilicus, was a cord-like ridge, which was taken by some who examined it for intestine, though it felt very like a large, long, and thick Fallopian tube. The measurements



were:—Girth at the umbilical level, 36 inches; from umbilicus to ensiform cartilage, 9 inches; to symphysis pubis, 7½ inches; to right ilium, 9 inches; and to left ilium, 9½ inches. There was some mobility in the tumour, both vertically and laterally. Fluctuation was distinct across the whole tumour, in all directions. The left loin was dull on percussion, the right tympanitic. The uterus was high, the os hard and fissured, admitting the tip of the finger; the cervix short. No part of the tumour was below the brim of the pelvis. The catamenia were expected in a few days. They recurred regularly every three weeks—lasting five days. Dr. Junker examined the urine and reported—'No albumen; deposits—urates, mucus, and epithelium.' She was subject to occasional nervous attacks, during which she was partially unconscious. She said they began by palpitation. She had four while in hospital; but they were regarded as hysterical, and attracted little attention.

The heart and lungs appeared to be healthy. The catamenia came on, and lasted a week, ceasing on December 29th; and on January 3rd, 1867, chloroform having been administered by Dr. Junker, I made an incision five inches long, extending downwards along the linea alba, from one inch below the umbilicus. On opening the peritoneum, I at once found that the hard roll, or ridge, observed running down the front of the tumour, was part of the transverse and descending colon, adhering closely by means of the meso-colon and omentum, both to the cyst and to the abdominal wall. I separated some of these attachments, in order to tap the cyst safely. On introducing the trocar, about fifteen pints of fluid escaped. It had the appearance of pea soup. When the cyst was empty I made some further separation of omentum and intestine; and when passing my hand round the right side of the cyst, what appeared to be another cyst gave way, and between one and two pints of clear fluid escaped. I then found that the deep attachments of the cyst were too close to admit of separation; and after tying three vessels which were bleeding in the separated omentum, and cutting off the ligatures short, I closed the wound.

The patient rallied slowly from the chloroform, and complained of pain, which was relieved by an opiate. Two other opiates were given at night—the total quantity given amounting to 50 minims of laudanum. Three hours after operation a small quantity of clear urine was drawn off by the catheter. After this not a drop of urine entered the bladder. At 10 P.M. the temperature was 98·4°; pulse 116; respiration 28. The next morning the pulse was 120, and very feeble; skin dry; temperature 98°; respiration 30. She was comatose, but easily roused, and answered questions sensibly. The coma gradually became more profound, and she died thirty hours after operation.

On examining the body seventeen hours after death there was no *rigor mortis*. The wound had united well. There were about four pints of blood-red serum, and a small tea-cupful of blood-clot in the peritoneal cavity. The right kidney was enlarged, and very soft; the cortical substance very friable, pale yellow in colour. The calyces and pelvis were much dilated, and the thin sac formed by this dilatation had given way longitudinally. A calculus, weighing forty grains, was in one of the calyces, forming a perfect cast of the calyx. The bladder was

contracted and empty. The uterus and ovaries were healthy. The left kidney formed the cystic tumour, which is described as follows by Dr. Junker:—

'The left kidney formed a cyst larger than an adult head. It presented one large cavity, composed of several wide pouches, arranged vertically at one side of the principal cavity. The stroma which formed the external wall was of varying thickness; thicker and stronger at the base of the pouches; thinner and less dense around the main cyst. It had a serous external coat; at some places hypertrophied, at others atrophied. Next a fibrous structure (fibrous capsule of the kidney). This was followed by what appears to have been the cortical substance of the kidney, and from which portions could be traced into the septa (the former columnæ Bertini) which separated the pouches (the expanded calyces). The main cyst (the original pelvis) was formed by the peritoneal and fibrous capsules. The medullary portion could not be well distinguished by the naked eye from the thickened lining membrane. Thus the tumour appears to be a good specimen of genuine hydronephrosis, in which pelvis and calyces expand into a large cavity, and produce by pressure atrophy of the original structures of the organ.

'The peritoneal coat was rough with shreds of the broken down, extensive, and intimate adhesions. Some of the neighbouring organs, or portions of them, were so intimately connected with the tumour that their separation was impossible, and portions had to be cut off in order to remove the cyst. Such connexions existed between the spleen, the head of pancreas, the great curvature of stomach, principally at the pyloric end, the duodenum, a part of the left lobe of liver, coils of small intestine, omentum and mesentery, and along the entire extent of the vertebral column, as low as the second lumbar vertebra to these bodies, and their left transverse processes, and to the right transverse processes of most of the dorsal vertebræ. No adhesions, however, existed between the tumour and the bladder, uterus and its appendages, or the rectum.'

After the information obtained by the post-mortem examination, I made further inquiry into the history of the case, especially as to the state of the urine, and I learned from Mr. Scott that while the patient was under his care in the Hospital for Women, in January, 1866, the urine contained pus and

albumen, was alkaline, and of low specific gravity, about 1005. He had ' no doubt of the tumour being ovarian, but considered the case an unfavourable one for operation, believing the front of the tumour was crossed by a loop of intestine which would, in all probability, be firmly adherent throughout its course; from the certainty of considerable adhesion, in consequence of the repeated attacks of inflammation; and from the presence of pus and albumen in the urine, with a feeble circulation. The quantity of pus varied considerably during her stay in hospital; albumen was pretty constantly present.' Dr. M'Donnell has ascertained that, when twelve or fourteen years old, she was struck by an iron shovel with great violence on the abdomen, near the left ilium. ' She was felled on the spot, and remained insensible for some (indefinite) time. She was ill afterwards, and attended at St. Bartholomew's and other hospitals for eighteen months as out patient. She told her husband that during all this time she "suffered much from the urine," but did not explain more precisely the nature of the suffering; for four or five years subsequent to the first period of eighteen months, and for a like period during the first years of married life, she suffered pain and distress, referred to this injury. Her pregnancies were always attended with distress—indeed during her whole married life, 26 years, she repeatedly suffered from deep-seated pain in the abdomen where the injury was inflicted.'

A single lady, fifty-nine years of age, first consulted me in June, 1865. She then had a tumour which filled all the left side of the abdomen and extended upwards under the left false ribs. It had been observed for nearly two years, but its increase had only been rapid for about six months. In August, 1866, fluctuation was detected in the upper part of the tumour, and five or six pints of yellowish pyoid fluid, with mucous flakes floating in it, were removed by tapping. A roll of intestine adhered to the upper part of the tumour on the right side. Relief followed the tapping for a time; but a second tapping was necessary in November. The true nature of the tumour then became apparent. The presence of intestine in front of the tumour, and the limitation of the tumour to the left side of the abdomen, while the uterus was freely moveable, were the chief guides in diagnosis, as the urine

was normal, and there was nothing characteristic in the fluid removed by tapping. In April, 1867, the patient fell when out walking, and ruptured the cyst. She died twenty-eight hours afterwards; and Dr. Morton, of the Abbey Road, found a large quantity of turbid fluid in the peritoneal cavity, corresponding with similar fluid found in a large ruptured cyst of the left kidney. The renal tumour filled all the left half of the abdominal cavity. Its lower end dipped down into the pelvis, but was quite free. Its upper end adhered to the spleen. The ruptured cyst contained, besides the fluid, a quantity of very thick viscid mucus, and seven calculi of varied chemical composition. The largest was an inch and a half in its long diameter; the smallest was as large as a hazel nut; two were smooth; five were rough, and very irregular in outline. One calculus was loose in the cavity, as well as a quantity of lithic acid gravel. The other calculi were imbedded in the pelvis and dilated calyces. The ureter was completely occluded, and no communication could be found with the bladder. The right kidney was slightly enlarged. The uterus and its appendages were healthy. The calculi are in the Museum of the College of Surgeons.

The case now to be related shows the difficulty of diagnosis arising from the enormous bulk which effectually obscured all the indications to be gathered from manipulation, either externally or by the vagina. A single woman, aged thirty-five, was admitted into the Samaritan Hospital in December, 1870, with the abdomen greatly enlarged. The dimensions were, girth at umbilical level, 60 inches; from ensiform cartilage to umbilicus, 14 inches; from umbilicus to symphysis pubis, 14 inches; from right ant. sup. sp. of ilium to umbilicus, 16 inches; from left do. to umbilicus, 21 inches. There was extreme œdema of the abdominal walls, which were very thick, not marked with the lineæ albicantes, and showed only a few dilated veins. The skin was red and tender, but not painful on pressure. The fluctuation was scarcely perceptible, and only doubtful in the lower part of the abdomen; there was no crepitus, and the sounds on percussion were dull all over the swelling. The uterus appeared to be small, normal in size, and moveable. No tumour could be felt in the pelvis. Some years ago she had been treated with iodine for bronchocele. She said she was

pretty well a year before, though she had been subject at times to swelling of the body, which went down again. About Easter, 1870, she began to suffer from dyspnœa and anasarca of the legs, and the body was found to be permanently increasing in size. She maintained that the dyspnœa and anasarca preceded the abdominal swelling. Since that time she has gradually attained her present size, with very great suffering. The tumefaction of the abdominal walls was too great to admit of any satisfactory diagnosis as to the nature of the tumour. This could only be ascertained by an exploratory incision, which was accordingly made between the umbilicus and symphysis pubis to the extent of six inches. Much serous fluid escaped, and three or four superficial vessels were tied. Four or five pints of clear serum flowed out when the peritoneal cavity was opened, and a solid tumour was exposed, very firmly adherent and vascular on its surface. One large vein at the upper part bled so freely that, after vainly trying to apply ligatures (for the soft granular tissue gave way before the silk), I used the actual cautery and solid perchloride of iron. The wound was closed with sutures and long bands of strapping. It did not unite well, and after two or three weeks it opened, and allowed the tumour to protrude a little. There was continued drainage of serum from the gaping incision, and from punctures made at various times in the legs and thighs, which relieved the urgent dyspnœa and prolonged life, but the patient gradually got weaker, and died eight weeks after the operation.

The tumour was found adherent to the abdominal walls, to the liver, omentum, and descending colon. Behind, it was inseparably connected with the right kidney, which had to be removed with it. The tumour alone weighed eighty-four pounds. The uterus and both ovaries were healthy. Dr. Wilson Fox reported that the tumour was 'fibro-plastic,' that the right kidney could only be separated from it by careful dissection, and that it probably originated in the kidney, or in the peritoneum covering it. Portions of the tumour are preserved in the Museum of University College.

Dr. Bright also relates the case of a married lady, about thirty-four years of age, and the mother of many children, who for three years had a tumour on the left side of the abdomen; the exact situation of the part at which it commenced is not

ascertained, but it appeared to have been sufficiently low down to have excited a suspicion that it depended on the ovary. It increased but slowly, and did not appear to have occasioned constant or severe pain. She, however, died four months after her last confinement; and, on opening the abdomen, a large, but soft, tumour, was seen occupying the greater part of the left lumbar and iliac regions. It had contracted few if any adhesions, and bore a considerable resemblance to a distended stomach. The ureter, which was elongated, and but little dilated, made a tortuous course round it. There was no obliteration of its passage, but the pressure of the tumour had probably been the cause which impeded the escape of the fluid with which the kidney was distended. When cut into, it had the appearance of a membranous cyst, and contained a fluid like dirty, discoloured, watery pus.

Another case of great practical interest is that of a girl in her sixteenth year, who was sent to me by Dr. Wardell, of Tunbridge Wells, on account of an abdominal tumour. She was a fat, florid girl, and apparently in robust health; but her abdomen began to enlarge when she was about twelve years old, and went on increasing, not attracting any particular notice till May or June, 1871, when she was seized with some pain on the right side. This lasted only a few hours, and was followed by swelling, also on the right side, which disappeared after some days' rest, the general enlargement remaining. Dr. Wardell first wrote to me about her in October, 1871. A month later he wrote that the tumour was enlarging, and she was admitted into the Samaritan Hospital early in December. On December 15, the girth at the umbilical level was 35 inches, distance from sternum to pubes 15 inches, and from one ilium to the other, across the front of the abdomen, 15½ inches. Fluctuation was distinct all over the lower part of the abdomen, and the movement of a cyst was distinctly visible between the umbilicus and sternum—rising and sinking with the respiratory movements—the upper border of the cyst being about half-way between the sternum and the umbilicus. On both sides of the abdomen the sound was dull on percussion; so it was from the pubes to within two inches of the umbilicus. From thence to the upper border of the cyst in the centre it was resonant or tympanitic, and on pressure with the fingers the peculiar gurgling

and contraction of intestine could be felt. It was quite clear, therefore, that we had intestine adhering in front to the upper part of the cyst. Both loins and flanks were clear on percussion, the right more distinctly so than the left. The uterus was normal in size and situation. On the right side of the vagina a soft fluctuating tumour (the lower part of the cyst) could be felt just above the brim of the pelvis. The catamenia appeared when she was fourteen, and continued regular for four months, then ceased for four months, and since then have been regular, but rather excessive, lasting a week. There was some irritability of bladder. Very unfortunately, owing to a mistake, the urine was not examined.

The girl was kept in hospital, and on January 23, 1872, the girth had increased to thirty-seven inches, and each of the other measurements showed an increase of about an inch. The presence of intestine in front of the cyst led to the suspicion of hydronephrosis; but the resonance of both loins, and the fact that the cyst could be felt by the vagina on the right side, almost negatived this suspicion, and it appeared more probable that we had to deal with a multilocular ovarian cyst, to which intestine adhered in front. I made an exploratory incision on January 24, and at once came upon the cæcum, its appendix, and the ascending colon, which had been pushed upwards and across the median line by the cyst, which was behind it. I saw at once I had to deal with a hydronephrosis; so, pushing aside the intestine, I tapped the cyst. Twelve pints of fluid escaped through the canula, and I then found that the uterus and both ovaries were healthy. A small cyst in each broad ligament I felt, but did not disturb. When the cyst was empty, I fixed the opening in its wall to the abdominal wall by a harelip-pin, and then closed the wound by sutures.

The fluid removed from the cyst was clear, light yellow in colour, with a faint urinous odour, acid reaction, and specific gravity of 1006. On standing, a few flocculent clouds formed, and some red blood-corpuscles were deposited. On careful chemical examination, urea, urates, and chlorides were found in about the normal proportions of healthy urine. There were traces of uric acid. A very small amount of albumen and phosphates, but no traces of sugar, could be detected. On microscopic examination of the deposit large numbers of red blood-

corpuscles were seen, a few pus cells, some squamous epithelial cells, and granular cells, but neither tube-casts nor crystals.

The case so far as it assists in the study of diagnosis might end here, but the fever which followed the operation was so remarkable that I venture to quote, though somewhat out of place, some of the remarks which I made in a clinical lecture, which was published in April, 1872, in the 'Medical Times and Gazette':—'At two o'clock, half an hour before the operation, the temperature was about a degree *below* the normal standard —97·4°. A good deal of pain followed the operation, and thirty-five minims of laudanum were given (twenty by rectum and fifteen by mouth), and a quarter of a grain of morphia was injected under the skin. In three hours the temperature had risen to 100·2° and the pulse to 104; in three hours more to 101·8° and the pulse to 140. After three hours more the thermometer marked 102·4°—a rise of 5° in ten hours, after simply opening the abdomen and emptying a cyst. I have removed many large ovarian tumours, after separating adhesions, tying bleeding vessels, cutting away omentum, securing the pedicle, and freely sponging the peritoneal cavity, without anything like such a rapid elevation of the temperature of the body.

'Early on the morning after operation I found that the girl had passed a very restless night, but that she had slept at times, and only ten minims more laudanum had been given. The temperature at 3 A.M. was 101·8°, at 7 A.M. 100·6°, and at 9·30 A.M. 99·8°; the pulse being 116. The urine was pale and scanty, and examining it for the first time I found it loaded with albumen. She seemed better till the afternoon; then there was more pain, and fifteen drops of laudanum were given, the last opiate which was required. At 2 P.M. the temperature was 100·8°, at 6 it had risen to 102·6°, and at 10 it was still 102·6°; the pulse 136. She was lethargic unless roused, and fluid was evidently again distending the cyst; so I removed the silk which closed the opening in the abdominal wall from the pin which kept the opening in the cyst from sinking inwards, and inserted a glass tube. Three pints of urinous fluid at once escaped, resembling that removed at the operation. At midnight the temperature was 102·2°.

'At 4 in the morning of the second day the temperature was

103°. At 9 it was 104·2°, and the pulse was 140. There was a very free discharge through the glass tube—between two and three pints in twelve hours—and there was much less albumen in the urine. At 12 and at 4 P.M. the temperature was 104°, pulse 160. At 6 she was comatose and very restless; urine very scanty and albuminous; temperature 103·6°, pulse 128. Then I bled her from the arm to nine ounces, and sent the blood to Dr. Richardson. He told me afterwards that the specific gravity of the serum was normal, the clot and corpuscles also normal, that there was no excess of fibrine—in fact, nothing to distinguish it from perfectly healthy blood. At 7 P.M. the temperature was 103·2°, and at 8 102·6°; but at 10 it reached 105·2°, and at midnight 105·4°, the pulse being fully 140. Free discharge continued through the glass tube. The head was placed on a pillow of iced water, and the body was sponged every three hours.

'During the third day the state of uræmic fever and coma continued; the discharge through the tube was free, and the urine from the bladder scanty and albuminous. The temperature, which had fallen in the morning to 103·6°, rose in the afternoon to 108·4°, and by 10 at night to 110°. She lived through the night and up till noon of the fourth day after the operation, when she died; the temperature for several hours before death exceeding 111°. The thermometer used is only graduated up to 110°, but there is a space above fully equal to two degrees, and that was quite filled up by the mercury.

'Surely this rise of temperature is quite wonderful. The girl weighed about 120 pounds, and we know pretty nearly how much water and fat that would represent. We also know how much heat is required to raise a pound of water one degree or ten degrees in temperature. Suppose this girl's body before the operation represented 80 pounds of water at 97°, and when she died the same amount at 111°—an average of about 103° or 104° having been maintained for four days—it would not be very difficult to calculate the amount of coal which would have been consumed in the production of this temperature, providing no cooling process had been going on. But here natural and artificial cooling was kept up. The slow combustion of the constituents of the body under the influence of the oxygen introduced is constantly producing heat. The

quantity of heat which a full-grown man gives off in half an hour would be sufficient to raise the temperature of his body nearly three degrees of Fahrenheit. If no heat were given off, his temperature would rise continuously in each hour between five and six degrees. The maintenance of the constant normal temperature of our bodies at between 98° and 99° depends upon the amount of heat produced by combustion and the amount given off by cooling processes being nearly equal. This girl's cooling processes were going on, and they were assisted by the application of ice to the head and sponging the body with cold water. The loss of heat must have been very great, and yet the temperature of the body kept rising. The production of heat must therefore have greatly exceeded the normal production. The tissues of the body must have been oxygenated or burnt up at an extraordinary rate, even supposing the cooling processes—the secretion of sweat, evaporation from the skin, secretion of urine, lung ventilation, bronchial elimination, &c. —were not as effective as usual.

'Two very puzzling questions follow:—First, how did the operation check the elimination of urea in this girl, and lead to its presence in excess or to the ammonia resulting from its decomposition in her blood? and secondly, how does uræmia lead to fever heat or hyperpyrexia?

'The first question is a difficult one. The post-mortem examination showed that the left kidney was almost useless—it was so small and so changed that it could scarcely have acted at all; and the right kidney was in great part converted into a cyst which held twelve pints of fluid. Why no symptoms of uræmia showed themselves before this cyst was emptied, why they came on almost immediately afterwards, and why they continued (although a free drainage of urinous fluid was kept up from the cyst) I cannot explain. It would be easily understood if the operation had caused any check in this secretion from the right kidney—the left kidney being useless—but there was no such check; and we are led to the suspicion that the opium which was given to relieve the pain, or possibly the chloro-methyl by which the anæsthesia was kept up, may have been the cause of the first stoppage in the elimination of urea, or else that some injury to the nerves of the kidney may have been the first step in the fever process.

'Then, we ask, Why or how does the accumulation of urea or of ammonia in the blood lead to a rise in the temperature of the body? and to explain this we are driven to the consideration of the influence of the nervous system upon the production and regulation of heat. Experimental researches upon the effects of removal of the brain or of the spinal cord, or of portions of one or both, show that the oxidation of the tissues and the evolution of carbonic acid—the regulation of the production of heat—are under the control of the nervous system. The arrangements for the regulation of the cooling processes depend more upon simple physical relations. In cold air or cold water more heat is given off, but as soon as the surface of the skin is cooled, evaporation is checked, the flow of blood to the skin is checked, and so is the secretion of sweat. In hot air the skin is moist, and evaporation rapid; thus high atmospheric temperatures become tolerable through free secretion from the sweat-glands and active evaporation.

'A patient whose brain and spinal cord are supplied with blood charged either with urea, or with ammonia the product of the decomposition of urea, may be more or less in the condition of an animal whose brain has been removed. The regulation of the production of heat is lost; combustion goes on unchecked, and we may expect fever heat if the cooling processes do not keep pace with the excessive oxidation. If these cooling processes are also checked, of course the elevation of temperature will be more rapid and excessive.'

If the examination of the blood in this case by Dr. Richardson should be corroborated by further observation, and the blood in other cases of uræmic coma should be found normal, the belief that the symptoms depend on the poison of unpurified blood must be corrected, and the doctrine of the nervous origin of the fever will be strengthened.

It is evident from the cases just narrated that both solid and cystic tumours of the kidney may be mistaken for ovarian tumours. Solid renal tumours, whether cancerous or innocent, may resemble the malignant, pseudo-colloid, or cysto-sarcomatous tumours of the ovaries; while different varieties of ovarian cysts may be closely simulated by different forms of pyelitis and pyonephrosis, hydronephrosis, cystic degeneration, and the

growth of hydatids in the kidney. Perhaps the diagnosis may be facilitated by attention to the following propositions :–

1. Although intestine is sometimes found in front of ovarian tumours, and sometimes behind moveable renal tumours, these are very rare exceptions to the general rule that renal tumours press the intestines forward, and ovarian tumours press them backward. In other words, ovarian tumours are in front of the intestines, renal tumours are behind the intestines.

2. Large tumours of the right kidney usually have the ascending colon on the inner border of the tumour. Tumours of the left kidney are usually crossed from above downwards by the descending colon.

3. The discovery of intestine in front of a doubtful abdominal tumour should lead to a careful examination of the urine. It is possible that one kidney may be diseased and the urine quite normal, because the healthy kidney alone secretes urine. But the rule is that either blood, pus, or albumen, or characteristic epithelium, is detected—or some history may be elicited of their having been detected at some former period.

4. If any doubt be entertained whether a substance felt between an abdominal tumour and the integument be or be not intestine, percussion may not solve the doubt, because the intestine may be empty and compressed. But (*a*) an intestine when rolled under the fingers contracts into a firm, cord-like, moveable roll ; (*b*), the patient may be conscious of the gurgling of flatus along it, or the gurgling may be heard on auscultation ; (*c*), the intestine may be distended by insufflation, after passing a long elastic tube through the rectum.

5. Ovarian and renal cysts may both be subject to great alterations in size. When the kidney is the seat of disease the fluid usually escapes by the ureter and bladder. An ovarian cyst can only empty itself through the bladder after adhesion and a fistulous opening. It may discharge through the Fallopian tube and uterus, or into an intestine, or through the coats of the vagina. In either case the physical and chemical characters of the fluid discharged will be the chief guide in diagnosis.

6. If a correct history can be obtained, it may be expected that a renal tumour has first been detected between the false ribs and ilium, and that it has extended first towards the um-

bilicus, next into the hypochondrium, and lastly downwards towards the groin. An ovarian tumour has, in all probability, been first noticed in one inguinal or iliac region, and has extended upwards and inwards.

7. It is only a very small ovarian tumour, with a long pedicle, which could be mistaken for a floating or moveable kidney. The latter may be recognized by its characteristic shape, though it is often so misplaced that the hilus is turned upwards. The kidney is usually felt between the umbilicus and the false ribs, and may be pushed upwards and downwards, or laterally, to a varying extent, or into the lumbar region to the normal position of the kidney. When the kidney is pushed away from this position, the sound on percussion becomes tympanitic.

8. Just as renal tumours are usually associated with some evidence or history of hæmaturia, calculus, albuminuria, nephritic colic, or some notable change in the quantity or state of the urine, so ovarian tumours are usually associated with some change in the quantity and regularity of the discharge, or with suffering at the catamenial periods, and with some alteration in the mobility or situation of the uterus. But as in some rare cases of renal disease the urine may be normal, so in some rare cases of ovarian disease there may be nothing abnormal to be discovered in any of the pelvic viscera, nor in their functions.

By bearing these facts in mind an accurate diagnosis may be made in a very large proportion of cases. Some rare cases of exceptional difficulty may, however, be occasionally expected. Not as any excuse for the careless or ignorant, but as some solace to others who have erred unwittingly, and as an answer to some who, having little experience of the difficulties of actual practice, are apt to speak of all mistakes as inexcusable, I quote the following remark of one of the greatest clinical teachers of any age or country—Bright:—'I have known the enlarged kidney to be mistaken for disease of the spleen—of the ovary—of the uterus—and for a tumour developed in the concave part of the liver; *nor is it, perhaps, possible, by the greatest care and the most precise knowledge*, altogether to avoid such errors.'

Distended bladder.—Before dismissing the subject of renal

cysts, a word of caution may not be superfluous, reminding the young practitioner that the bladder, distended with urine, has, in several recorded instances, formed an abdominal tumour, which has been mistaken either for an ovarian cyst, or for ascites, and has been tapped, in some cases with a fatal result. I was once accidentally present in a hospital when a woman was about to be tapped. The peculiar projection immediately above the pubes at once struck me, and I suggested that the catheter should be introduced. Five pints of urine passed through the catheter, and the tumour disappeared. In this case the patient was supposed to be suffering from incontinence of urine from pressure of the imaginary cyst, the urine which dribbled away being simply overflow from the paralysed bladder. As in any case the use of the catheter will set every doubt at rest, it is useless to say more than that distension of the bladder is of common occurrence both in uterine and ovarian tumours which are fixed in the pelvis. In some cases it is only by the use of a small and long elastic catheter that the bladder can be reached and emptied.

Fæcal accumulations.—In his 'Clinical Lectures on the Diseases of Women,' Dr. Simpson says that there had been 'in the hospital a patient who was sent from the country, and presented on admission the colour and appearance of a person labouring under some malignant disease. The facial expression might have led you to believe that she was the subject of a cancerous diathesis. She had a tumour in the left hypogastric region, about the size of a fist. But under the use of croton oil it readily disappeared, and proved to be only a mass of fæces in the colon. You might suppose that it would be difficult to mistake such a tumour for any kind of morbid growth, and you might imagine that the patient would be suffering from such a degree of constipation as at once to indicate its real nature. But there is not of necessity any degree of constipation present. On the contrary, there is sometimes diarrhœa. Dr. Abercrombie told me he once attended, with some other physicians, a case where there were large swellings felt in the abdomen, and the patient suffered severely from diarrhœa. After death the swellings were found to be formed merely by hardened deposits of fæcal matter in the sacculi of the large intestine, the central tract

through the bowel being left free; and that he was then in attendance upon a patient suffering from obstinate diarrhœa, who at the same time had large scybalous masses accumulated in the colon. And you can readily understand how large collections of hard fæcal matter lying long in any part of the large intestine should at length give rise to such an amount of irritation there as to produce an attack of diarrhœa; and when this has become established, the original cause of it will readily be overlooked. The peculiar feeling of such a tumour will generally enable you to decide as to its true character: it feels like no tumour that I know of. On being examined either through the abdominal walls or through the rectum, it is felt to be hard and resistant; but if one finger be pressed steadily upon it for one or two minutes, it will at last indent like a hard snowball, and, as there is not the slightest elasticity about it, the indentation remains after the pressure is removed. If any doubt should still remain, the persevering use of aperients will clear up for you the diagnosis by causing the mass to be dissolved and carried off.'

Although I have several times seen lumps in the region of the cæcum and different parts of the ascending colon, which were clearly fæcal accumulations, yielding to the pressure of the finger, and, owing to their containing or being surrounded with gas, having a certain degree of resonance on percussion, yet I have never met with one of such a size as to be mistaken for an ovarian tumour.

Pelvic Cellulitis and Abscess.—Since the subject of pelvic cellulitis has been studied, and the effects of the effusion of serum and of lymph in the loose cellular tissue of the broad ligaments and neighbourhood of the uterus, followed by the formation of pus and its discharge either spontaneously or by surgical assistance, have become generally understood, it is not often that ovarian tumours, even when they are confined below the brim of the pelvis, have been mistaken for pelvic cellulitis or abscess. But it is very probable that many of the recorded cases of supposed cures of ovarian or uterine tumours have been merely instances of inflammatory exudations into some part of the pelvic cellular tissue, which have either been removed by absorption or have terminated in suppuration and the discharge of pus, either by the rectum, vagina, bladder, or

skin. Last year I saw a lady who had been supposed to suffer from ovarian disease, in whom a pelvic abscess discharged not only through the rectum, the bladder, the vagina, and in one loin, but gravitated down the leg, opening in the calf. A suppurating ovarian cyst might possibly end in the same way, but the history of the case, the severe pain, the high temperature at the onset of the disease before any considerable tumour had formed, the remarkable almost bonelike hardness and fixity of the swelling, as if inseparably connected with one or other ilium, and the flexure of the thigh from the way in which the psoas muscle is involved, are sufficiently characteristic. An ovarian cyst or a pelvic abscess which had burst into the peritoneal cavity would be necessarily attended by the same symptoms of perforating peritonitis. But in the one case the previous history would have been that of pelvic cellulitis, in the other that of an ovarian cyst which had become inflamed. An ovarian cyst to burst must be large. It is seldom that a pelvic abscess extends upwards above the umbilical level. Hardness may be felt in one or other iliac region or above the pubes, and a corresponding hardness or swelling may be felt by the vagina behind or in front or to one side of the uterus; and, if pus have formed, fluctuation may be detected. An ovarian cyst is not so firmly fixed in the pelvis; even if adherent there it does not give the same impression of close attachment to the pelvic bones. It seldom leads to such troublesome dysuria, to such rectal pain or tenesmus, to such constant throbbing, or to such enforced quiescence of the lower limb; and the general outline of an ovarian cyst can be more easily traced than the diffuse bulging of a pelvic abscess. The swelling in pelvic abscess is harder, more painful on pressure, and accompanied with nervous pains such as are usually called sciatica or pelvic neuralgia. It is very seldom that an ovarian cyst shows any tendency to point in the situation where there is the greatest tendency to point in pelvic abscess, that is in the roof of the vagina, very near the cervix uteri, either behind or in front or to one side of it. It is seldom that an ovarian cyst suppurates until it has existed for some time, or has attained a large size; but the whole course of a pelvic abscess, from its commencement till the discharge of pus is effected, is seldom more than from three to four weeks.

Hæmatocele.—As in pelvic cellulitis, so in hæmatocele, it is only a small ovarian tumour which has not risen out of the pelvis, or a large ovarian cyst which has suppurated, that could be mistaken for either the early and small or the later and large stages of pelvic cellulitis or hæmatocele. A small hæmatocele in the early stage produces much the same local conditions, is accompanied by very similar pain, and almost as much general fever as pelvic cellulitis, and is apt to be associated with about the same amount of pelvic peritonitis. Indeed it is very probable that many of the cases of pelvic cellulitis take their origin from a hæmatocele. Some blood escapes into the loose cellular tissue in the neighbourhood of the uterus about the time of menstruation; a clot forms, does little harm by itself, but pelvic cellulitis is set up, which becomes the more grave condition, and ends in abscess, the clot which excited it disappearing. It is only when the effusion of blood is large and sudden, its escape through the Fallopian tube prevented, and its general diffusion in the peritoneal cavity limited by peritonitis and adhesions, that a distinct pelvic or abdominal tumour is formed. It is only rarely that such a tumour extends as high up as the umbilical level; much more frequently it is either within the pelvis, behind or to one or other side of the uterus, or barely to be felt through the abdominal wall. These characters are quite sufficient to distinguish it from a large ovarian cyst. Small ovarian cysts do not commence so suddenly, are not so closely associated with the catamenial period, nor is their advent ushered in by such acute pain or febrile disturbance. An ovarian cyst is seldom dangerous to the life of the patient before it has attained considerable size, whereas a hæmatocele of very moderate extent and of sudden formation may be either rapidly fatal or lead to very dangerous symptoms.

The following narrative may serve to illustrate the above remarks, and I have seen several similar cases. A young lady was travelling from Paris to London. Before she reached Calais the menstrual discharge commenced. Between Calais and Dover she was wet, cold, and seasick. Before she reached London the discharge, which had begun freely, stopped entirely; she was in severe pain, and feeling extremely ill. Dr. Priestley was consulted next day, and found considerable swell-

ing in the right iliac region, with extreme tenderness on pressure. A high degree of fever and restlessness, with increase of the local swelling, and an absence of menstrual discharge, were the principal symptoms for the few succeeding days. Then some re-appearance of uterine hæmorrhage was accompanied by temporary relief; but this was followed by an increase of swelling, and by the fever assuming the hectic form. Dr. West, Mr. Paget, and Dr. De Mussy were all consulted, and when I first saw the patient her sufferings were so excessive that the examination could only be made when she was under the influence of chloroform. The abdominal swelling was principally confined to the right side, and extended nearly as high as the false ribs. The uterus was fixed, pushed forwards and to the left, and there was distinct pointing in the vagina behind and to the right of the uterus. The possibility of the existence of an ovarian cyst which had rapidly enlarged and become acutely inflamed was carefully considered, but the history of the case indicated so clearly hæmatocele followed by pelvic abscess, which was pointing towards the vagina, that puncture by the vagina was strongly urged, and was only deferred owing to the absence of a member of the family, and in the hope that as the abscess was distinctly pointing it would open spontaneously. A few hours after this consultation, sudden collapse and the well-known symptoms of perforating peritonitis set in, followed by death the next day.

This is not the place to discuss the treatment either of pelvic cellulitis or hæmatocele. All we have here to consider is the diagnosis between these conditions and ovarian disease; but I cannot refrain from expressing the strong opinion impressed upon me by a considerable number of cases, that, whenever any such quantity of blood, serum, or pus is effused in the neighbourhood of the uterus as to form a distinctly perceptible swelling, it is far better to puncture that swelling and to maintain an opening for drainage, than to hope for any spontaneous cure by absorption, or discharge through vagina, bladder, rectum, or skin.

As curiosities of surgical experience, but not arising sufficiently often to call for more than passing notice, and as morbid changes which may possibly be mistaken for ovarian disease, may be enumerated encephaloid tumour of the ilium,

enchondroma or osseous tumours projecting from the sacrum, angular curvature of the lumbar vertebræ, enlargement or malignant disease of the lumbar glands, or dissecting aneurism of the aorta. I know of one case where a tumour in the pelvis was punctured by the vagina; the patient died from bleeding before the surgeon left the room, and after death it was found that an aneurism of the aorta above the bifurcation had dissected downwards behind the peritoneum, and formed a considerable tumour in the hollow of the sacrum. I have seen three cases where encephaloid disease, arising in the cancellated bony tissue of the ilium, had not only projected backwards and towards the buttock, but so far inwards and upwards as to form a considerable abdominal tumour. In one of these cases the abdominal tumour transmitted a distinct pulsation from the aorta; in another the growth itself was pulsatile; in the third the rectum was completely occluded by the growth. The other states above enumerated scarcely need further remark; a little attentive consideration of the history and progress of the case will be sufficient to distinguish them from any form of ovarian disease.

Diagnosis of the different kinds of Ovarian Tumours, and of their Adhesions.—In a case of abdominal tumour, having excluded the possibility of ascites and encystic dropsy of the peritoneum, and of peritoneal, uterine, and other tumours, which may be mistaken for ovarian cyst or tumour, and satisfied ourselves that we have an ovarian tumour to deal with, the next questions are whether the cyst is simple, with limpid contents, or with viscid contents, or multilocular, or solid, whether it is free or adherent, and, if adherent, whether the adhesions are of such a character that they may be separated without excessive risk, or are so extensive and intimate that separation would be almost certainly fatal. These questions are evidently of the first practical importance, as on their solution depends the decision whether tapping should or should not be recommended, what amount of relief might be obtained from it, whether it would be of more than temporary utility, whether iodine injection might follow it, or drainage be kept up, or whether ovariotomy would be the best practice, whether this operation could be done with more or less than the average risk, or, lastly, whether the risk would be so great

that the operation could not be contemplated, even if the patient were herself anxious thereby to escape from her sufferings, whatever the risk might be.

As a simple cyst, especially if extra-ovarian, may be not only temporarily emptied, but emptied with the probability that the fluid will not collect again, it is interesting to ascertain if possible whether a cyst is really simple, or whether there may be one large cyst with smaller ones concealed. A simple extra-ovarian cyst may be suspected under two different conditions: 1st, when it has been of many years' duration with very little damage to the general health; and, 2ndly, when it has formed with such extreme rapidity as to be almost certainly mistaken for ascites. In the first of these two conditions the cyst is generally flaccid; in the second excessively tense. In the first there is little or no suffering beyond the inconvenience arising from the bulk of the cyst; in the second there is all the suffering which accompanies rapid abdominal distension. Both are very apt to be mistaken for ascites, but are of course distinguished by the signs already enumerated of the enclosure of the fluid in a cyst.

When by internal and external examination no nodular hardening of the cyst wall can anywhere be detected, where the cyst is uniformly smooth and elastic over its whole surface and extent, where the wave of fluctuation is equally perceptible in all directions, the inference is very clear that the cyst is practically unilocular; and if in a young person it is either flaccid and of long duration, or excessively tense and of recent formation, the inference is almost equally clear that the cyst is extra-ovarian, and the contents limpid. There are many cysts which, although practically unilocular, have on some part of the wall of the principal cyst, most commonly near the base, a group or groups of secondary cysts, which negative the supposition that the cyst may be extra-ovarian, and lead to the belief that the contents, instead of being limpid, are viscid.

When the resistance of the cyst wall to pressure is very considerable, and the wave of fluctuation slow or doubtful, the probability is that the cyst wall is thick and the contents colloid. If cartilaginous or bone-like masses can be felt in any part of the cyst wall, a dermoid tumour may be suspected, especially in a fair and young patient. It is possible that

there may be a simple cyst of each ovary, one on each side. This I have only seen once, in a young lady whom I attended with Dr. Priestley. There was a distinct sulcus between the two cysts, near the median line, and it became a question whether this was owing to disease on both sides, or to the peculiar shape of a cyst on one side. It was supposed that the latter opinion was more probably true because the catamenia were quite regular; but at the operation there were two free simple ovarian cysts, which were removed without difficulty. In one case the appearance leading to suspicion of both ovaries being diseased depended on a deep sulcus in the cyst, caused by the rotation of the tumour and the pull on the Fallopian tube. If the resonance of intestine can be distinctly traced low down in front between two cysts, the probability of ovarian disease on both sides is strong.

Multilocular cysts are often as uniform in outline as simple cysts, but more frequently their surface is more or less irregular, and the projections of different cysts can be both felt and seen. In this case these projections vary in hardness, and the fluctuation is limited by the divisions between the cavities. A septum must be very thin which does not intercept the wave of fluctuation; but in some cases of colloid tumours, where the septa are imperfect, the wave of fluctuation is almost as distinct and instantaneous as in a true unilocular cyst.

Boinet believes that the colour and consistence of the contents of multilocular cysts may be predicated before tapping. The progress of the disease, the more or less acute pain, the signs of inflammation more or less acute, and repeated, and the state of the general health, will be sufficient to indicate if the contents are serous or purulent, and what their colour may probably be. When abdominal pains have been frequent, and the abdomen is tender on pressure, it is probable that, whether the cyst is unilocular or multilocular, the contents will be reddish, sero-sanguinolent, or resemble coffee or chocolate. When the temperature of the patient is high, ranging from 100° or 101° in the morning to 103° or 104° at night, and emaciation is progressive, appetite lost, thirst troublesome, sleep disturbed, nausea or vomiting distressing, and the abdomen tender on pressure, with hurried pulse and respiration, it is extremely probable that one or more of the cysts may

contain pus; and that, when these symptoms are present in an extreme degree, or have lasted for a considerable period, the pus has become fetid. Blood may be found in one or more of the cysts, either as an immediate result of twisting of the pedicle, or as a more slow and gradual oozing from the degenerative changes which have been described in the chapter on Pathology. When any considerable amount of blood has been poured into the cavity of an ovarian cyst, all the well-known signs of internal hæmorrhage are necessarily observed. I have twice seen sudden death occur in this way. In one case five pounds of blood and clot were removed from the cyst into which they had been suddenly poured in consequence of the giving way of a large vein which ran along the lining membrane of the cyst. In another case the patient bled to death, the blood escaping through the Fallopian tube and uterus from a large cyst of the left ovary.

The solid tumours of the ovary are excessively rare, as has already been stated in the description of the fibrous tumours of the ovary. In the only two cases which I have seen, they were surrounded by fluid free in the peritoneal cavity, and it was only after the removal of this fluid that the size and consistence of the hard body could be made out. But solid portions of large tumours, which fluctuate in other parts, are by no means rare. They can only affect the question of operation inasmuch as it may lead to a somewhat greater length of incision being necessary than in cases where no solid portion of considerable size exists.

Adhesions.—In the early days of ovariotomy great pains were taken to ascertain whether a tumour was free or adherent, and if extensive adhesions to the abdominal wall were believed to exist, ovariotomy was considered to be impracticable or improper. Mr. Walne, in 1843, began his operations with a small incision just large enough to enable him to ascertain with his finger whether the cyst were free or not. Dr. Frederick Bird published a great number of cases in which he made an exploratory incision and abandoned the operation as soon as he found that the adhesions were intimate. He was so anxious to ascertain the presence or absence of adhesions that, even before making an exploratory incision, he used to insert needles through different parts of the ab-

dominal walls into the cyst, believing that by watching the movements of these needles, as the patient inspired and expired, he could ascertain whether the cyst moved beneath the abdominal wall or not. Others watched the movements of the canula after tapping, with the same intention and belief, only to find that all these signs were fallacious. Before I had operated on any considerable number of cases, I began to doubt whether the presence or absence of adhesions seriously affected the result of the operation, and, as soon as the number of the cases of ovariotomy could be reckoned by the hundred, it became very clear that, although adhesions to the abdominal wall might lead to some little delay and difficulty in the removal of the cyst, and to some care in removing any effused blood from the peritoneal cavity, and to some trouble in closing bleeding vessels, yet that the statistical results were absolutely identical whether the cysts were adherent or free.

Practically, therefore, in determining whether ovariotomy should be recommended or not, adhesions to the abdominal wall may be altogether disregarded. Still, it is a matter of some interest to know what are the signs by which a free or an adherent cyst may be pretty certainly recognised. To make this examination the patient should be placed in a good light, lying on her back, with the shoulders and knees somewhat raised, and the whole abdomen uncovered. By watching the abdominal movements during deep inspiration and full expiration, a free ovarian cyst may be seen, providing the abdominal wall is not too thick, moving upwards and downwards with every breath. When the surface of the cyst is raised into irregular elevations and depressions, the free mobility of the cyst is perfectly manifest and indubitable; but when the surface is uniform it is only the upper border of the cyst which can be seen to move, and it may be necessary to ascertain by percussion how high the upper border extends above the umbilicus, before this can be accurately seen, because the transverse colon, following the respiratory movements, may be easily mistaken for a moving cyst. When the abdominal wall is thick it may be impossible to see the movements of the cyst during inspiration and expiration, but quite easy to follow these movements by the varying position

of the dull sound of the cyst and the clear sound of the colon under percussion.

The dull sound at the upper boundary of the cyst will often descend from one to two inches during inspiration, and rise during expiration, just as the cyst is seen to move in patients where the abdominal wall is thin. When the cyst is adherent to the abdominal wall no such freedom of motion can be observed, nor is it possible. The cyst and the abdominal wall must move together unless the adhesions are loose. I have three or four times seen cases where the cyst moved freely beneath the abdominal wall, but in which very firm adhesions had to be separated, these adhesions consisting of flattened cellular bands or cords of fully an inch in length. My belief is that these long bands of adhesion have been owing to the free motion of the cyst before the lymph forming the connection had been thoroughly organised or hardened. Once aware of this source of fallacy, it is easy to correct it by placing the hands flatly over the abdomen while the patient breathes. If the cyst be really free no crepitus will be felt, whereas any long bands of adhesion give a sensation of grating or crackling to the hand, which can only be mistaken for the rubbing of recent lymph, or for the presence of omentum in front of the cyst. With this sensation of crepitus friction sounds are always audible.

This interesting point in diagnosis presented itself in the case of an unmarried girl, eighteen years of age, sent to me some years ago by Dr. Whitehead, of Manchester. The tumour, which had not been tapped, was observed to move very freely beneath the abdominal parietes on deep inspiration, and I therefore expected to find a non-adherent tumour. But at the operation on June 13, 1864, very firm adhesions had to be separated. They were, however, sufficiently long to admit of the cyst moving freely. Long and very firm adhesions anteriorly and in the right iliac fossa, and a very extensive surface of adherent omentum, were separated by the hand with some difficulty, and a close adhesion to the fundus of the bladder was separated by very careful dissection.

The action of the recti abdominales should be watched, as it varies with the different conditions of ovarian tumours. The recumbent patient should be directed to try and sit up

without assisting herself by her hands or elbows. This effort puts the recti upon the stretch, and if a tense ovarian cyst is free from adhesion, the muscles form a projecting ridge in the centre of the abdomen, the cyst falling backwards and to the sides. This appearance can only be imitated in cases of adherent cyst when the cyst is flaccid or partially empty.

The umbilicus is not affected by the movements of a free ovarian cyst. The cyst moves with the respiratory movements, or may be pushed in various directions without any visible effect on the umbilicus, but any movement communicated to a cyst which adheres to the front of the abdominal wall is immediately followed by a corresponding movement of the navel.

The crepitus felt, and the friction sound heard, when recent lymph has been effused upon the peritoneal surface of the cyst or upon the peritoneum in apposition with the cyst, was formerly supposed to be an evidence of adhesion, but this is certainly an error. So long as the friction can be felt or heard, movement must be free. As soon as adhesion takes place friction ceases, and can only be felt again if the lymph which forms the connecting medium becomes so stretched and elongated that motion again becomes possible between the cyst and the abdominal wall. It is quite common for crepitus to be present for a time, and to disappear without any adhesion, if the lymph is removed or the surface of the peritoneum is again rendered smooth. The crepitus which is produced by the presence of omentum between the cyst and the abdominal wall may be mistaken for the crepitus of recent lymph or of old stretched adhesions, but it is not impossible to distinguish them with tolerable certainty. There is a softer or more doughy feel about the omentum, and absence of the tenderness and general feverish condition which accompany the presence of recent lymph. It is seldom that omentum is present over any part of a cyst which is not near some intestine, and this is easily recognised by its resonance on percussion and its gurgling under pressure.

But while adhesions to the abdominal wall are of but little practical importance in relation to ovariotomy, adhesions low down in the pelvis are, on the contrary, of very great importance. It may be extremely difficult to separate them without

serious injury to the rectum, or the bladder, or the ureters, or to large blood-vessels, or to nerves, and it may be excessively difficult to find every bleeding vessel and to stop the loss of blood. If adhesions low down in the pelvis are very intimate, it may be quite impossible to separate them upon a living patient, and by no means easy to do it by dissection after death. These pelvic adhesions may be always suspected when the mobility of the uterus is considerably restricted, when it is either pulled up out of the reach of the finger in the vagina, or is pressed backwards or forwards or to either side by the lower portion of the tumour, which can be felt by the vagina or rectum. It is quite possible that the lower portion of an ovarian tumour may be pressed downwards and moulded in the pelvis, and yet not be adherent there. This may be sometimes ascertained by placing the patient on her elbows and knees, with the pelvis raised and the thorax depressed. Firm pressure with the finger in the vagina or rectum while the patient is so placed will sometimes show that the tumour is not fixed in the pelvis. Occasionally this can only be ascertained after tapping. If in this position, and especially after tapping, part of an ovarian tumour always remains low down in the pelvis, altering the position and restricting the mobility of the uterus, it is extremely probable that such pelvic adhesions exist as would render ovariotomy very difficult, and much more than usually hazardous. But I have known the uterus to be drawn up out of the pelvis, and Douglas's space to be filled by an ovarian tumour, although there were no adhesions whatever. Both ovaries were diseased; one was prevented from rising by the other, and both were successfully removed.

Adhesions to the liver, stomach, or spleen, can never be accurately made out before operation. Sometimes a coil of intestine can be distinctly traced, always remaining attached to the same part of the cyst wall. Further than this, adhesions to the abdominal viscera can only be ascertained after the operation has been commenced.

CHAPTER VII.

ON THE MODE OF INVESTIGATING AND RECORDING CASES.

When about to examine a patient who is supposed to have an abdominal tumour, with the object of ascertaining if she really has such a tumour or not, and if it is ovarian, and if ovarian which of the different forms of ovarian cysts or tumours it may be, and how its size and connections and the general condition of the patient may influence the mode of treatment to be preferred, and guide us in estimating the probable result of any operation, it is very desirable and convenient to proceed upon some uniform plan. After trying different varieties of case books and hospital tickets, I began about twelve years ago to keep a separate book for each patient. Any letters I received from the usual medical attendant were pasted into this book with my own notes, and as the note-books accumulated they were arranged in distinct divisions according to the nature of the case, and bound together in series of twenty cases to each volume. By means of a general index it thus became quite easy, on seeing or hearing from any patient, even after several years, to refer to the past history of the case and make any additions which appeared to be important. I found this plan so very convenient that when I published the first volume of my work on Diseases of the Ovaries in 1864, I appended the form of Note-book which I had adopted up to that time; and, hoping that other surgeons would keep notes of cases of ovarian disease in the same manner, I had separate copies printed on writing paper with sufficient space for notes, and arranged that Messrs. Churchill should supply the Note-books. After about three years, this edition of the Note-book was exhausted; and in 1868 I published a second edition containing some slight modifications which experience had shown to be desirable, and an additional diagram for sketching in the relations of pelvic portions of tumours. Last year a third edition was called for, and a few

more slight alterations were made, bringing the Note-book to its present form. It is reprinted here as a practical sequence to the preceding chapter on Diagnosis, and I believe it will be found that no point of importance is omitted, the observation of which would assist in arriving at a correct decision.

As soon as a patient is seen a Note-book is taken, and the first page is at once filled up. The date of the visit is inserted with the index number, and then a few questions are necessary to enable one to fill in the answers as to name, age, residence, occupation, conjugal condition, number and ages of any children, and the name of the usual medical attendant. It saves a great deal of trouble in after years if these particulars are noted very fully and accurately; and the surgeon may then proceed to note all that he can see and ascertain for himself by inspection of the patient, before he proceeds to question her further. This plan will be found to save much time, the subjective examination being limited to particulars which the objective examination has shown to be important. Even then the first visit or consultation is necessarily a long one; but a great deal of time and thought and tax on memory are spared at subsequent visits.

It will be observed that four pages are taken up by the objective examination, or the notes of what the surgeon can see for himself without asking any questions of the patient. This is grouped under the general head 'State at First Visit.' All the particulars as to the general appearance of the patient, her complexion, the degree of emaciation, her habits of life, and the state of the surface of her body, have some special signification as pointed out in the preceding pages, especially in the sections on Uterine Tumours, on Pregnancy, and on Phantom Tumours.

Proceeding to inspect and measure the abdomen, the diagram (which differs from those of Bright and others in so far as it has been corrected by photographs of well-formed women) will assist the observer in tracing such outlines of the liver and the spleen as he can discover by inspection, palpation, and percussion, and of any tumour which can be seen or felt. The lines at the level of the umbilicus and the ensiform cartilage, and the central line from the sternum to the symphysis pubis, are all that are necessary for notes of measurement. Spaces are left for subsequent records of size. At pages 232–5, the import of the visible

mobility of any tumour, and the evidence as to the presence and extent of adhesions, have been pointed out; and the lessons to be learned by percussion and auscultation have been particularly referred to in the sections on Ascites, Renal Cysts, Pregnancy, Uterine Tumours, and Tympanites. The points to be observed in the examination of the pelvis have been fully described when considering the diagnosis of pelvic cellulitis, hæmatocele, uterine tumours, and pregnancy. It is hardly necessary to add the very obvious caution not to use the sound to ascertain the length of the uterine cavity in any case where pregnancy is at all probable. But it may not be out of place to urge that examination of the uterus by the rectum is often more useful and affords much more information than is commonly supposed. By the vagina the os and cervix are felt, and any flexion or version detected; but alterations in the body or fundus, which cannot be reached by the vagina, may often be felt through the rectum.

Proceeding to obtain information as to the catamenia, a few questions become necessary; and so with regard to the urinary and digestive organs, the nervous system, and the state of the heart and lungs. In a hospital the house surgeon or clinical clerks, and in private life the busy practitioner, are apt to pass over these pages as of no great importance, or to defer the necessary examination to some future day; but it is very important that it should be done well and thoroughly before any course of treatment is determined.

Having completed the examination as to the state of the patient at the first visit, the page relating to the family history, place of birth and residence, the influence of soil, climate, water-supply and drainage, and the mode of life of the patient should be filled up, especially noting any moral causes, previous diseases, or accidents which may have preceded and possibly have influenced the origin and progress of ovarian disease. This may not appear very important in each case by itself, but as the basis of statistical information it may become of very great consequence. Then we proceed to investigate the early symptoms of the disease, carefully noting the first signs of ill health, and a number of symptoms which are more or less generally complained of, pretty much in the order in which they are enumerated as 'Early Symptoms.'

The succeeding page contains a list of the symptoms usually noticed as the disease progresses either to spontaneous discharge of fluid or rupture of the cyst, or until tapping is practised and repeated, or some further treatment has to be considered.

A space is left on the next page where the surgeon should enter his diagnosis as fully as he can, and then endeavour to estimate the probable duration of life if palliative treatment only be adopted. A note of the general treatment recommended may then be made, including, of course, such rules of living, especially with reference to air and diet, clothing and exercise, as may be advised. Notes of medical and surgical treatment follow, and in the following page the progress of the disease at subsequent visits may be noted and marked on the diagram.

If ovariotomy be performed, all the essential particulars of the operation may be noted in the order sketched in the succeeding pages.

A page is then left for a description of the tumour, and three ruled pages follow for the progress of the patient after operation, daily and hourly notes of temperature, pulse, and respiration, and of any medical or surgical treatment. Another page is left for the result, and a few blank pages follow for the subsequent history.

Number.

Date of First Visit.

Name.

Age.

Residence.

Occupation.

Married, Single, or Widow.

If Married, When?

Children—

Age of eldest.

Age of youngest.

Abortions.

Usual Medical Attendant.

STATE AT FIRST VISIT.

General Appearance.

Complexion.

Emaciation.

Habits of Life.

Surface of Body.

Temperature of skin and extremities.

Perspiration.

Glandular swellings.

Eruptions.

Ulcers.

Varicose veins.

Œdema.

Mammary Areolæ.

STATE AT FIRST VISIT.

INSPECTION AND MEASUREMENT OF ABDOMEN.

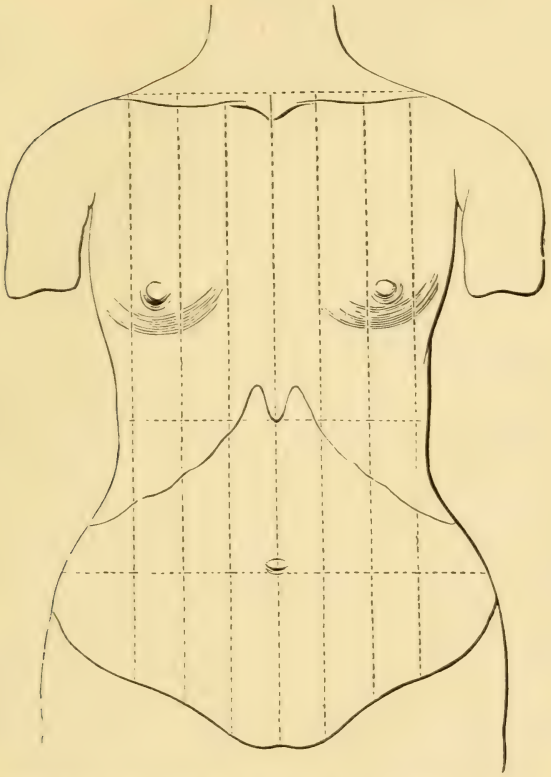


DIAGRAM FOR OUTLINES OF TUMOUR, LIVER, AND SPLEEN.

Measurements, in inches.	Date		
1. Girth at umbilical level			
2. From ensiform cartilage to umbilicus			
3. From umbilicus to symphysis pubis			
4. From right ant. sup. sp. of ilium to umbilicus			
5. From left ditto to umbilicus			

STATE AT FIRST VISIT.

INSPECTION, PALPATION, PERCUSSION, AND AUSCULTATION.

Mobility of tumour.

Evidence of adhesions.

Thickness of parietes.

Lineæ albicantes.

Dilated veins.

Fluctuation.

Impulse.

Crepitus.

Tenderness.

Sounds on percussion.

Sounds on auscultation.

Lumbar sounds on percussion.

Effects of pressure on other organs.

STATE AT FIRST VISIT.

EXAMINATION OF THE PELVIS.

UTERUS.

Situation.

Deviations.

Mobility.

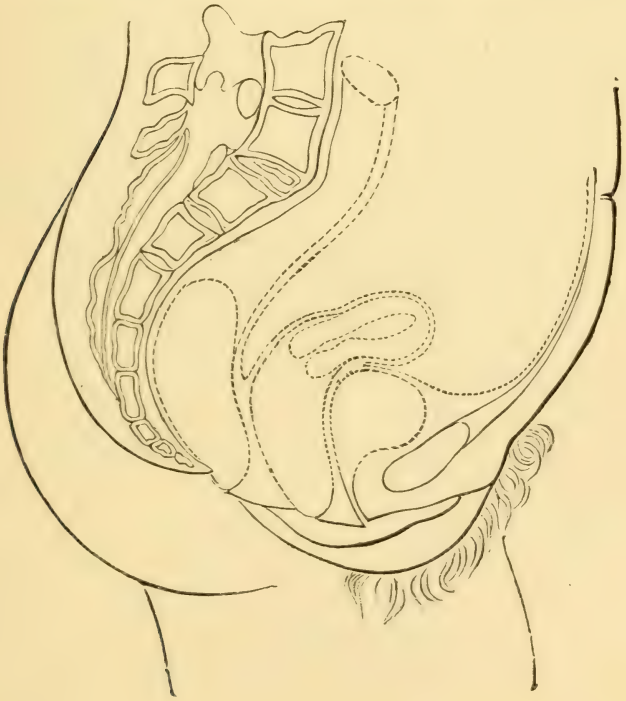
Length of cavity.

Condition of os and cervix.

VAGINA.

RECTUM AND ANUS.

DIAGRAM FOR OUTLINE OF PELVIC PORTION OF TUMOUR.



STATE AT FIRST VISIT.

Genital Organs.

Catamenia now.

Date of commencement.

„ cessation.

Any sudden suppression?

History of excess, or

„ deficiency.

Leucorrhœal or other discharge.

Urinary Organs.

Dysuria.

Incontinence.

Irritable bladder.

Urine, colour and odour.

„ Specific gravity.

„ Reaction.

„ Quantity in 24 hours.

„ Albumen, sugar, pigments.

„ Deposits.

„ „ inorganic.

„ „ organic.

„ „ Blood.

„ „ Pus.

„ „ Epithelium.

„ „ Casts of tubes.

„ „ Confervoid vegetation.

STATE AT FIRST VISIT.

DIGESTIVE ORGANS.

Tongue.

Appetite.

Thirst.

Flatulence.

Action of Bowels.

NERVOUS SYSTEM.

Sleep.

Mental condition.

Neuralgia.

Hysteria.

RESPIRATORY ORGANS.

Breathing.

Cough.

Expectoration.

Physical signs.

Rests best on side.

CIRCULATION.

Pulse.

Sounds of heart.

HISTORY.

Hereditary influence.

Parents.

Brothers and sisters.

Other blood relations.

Where born and formerly residing.

Climate or local peculiarities.

Soil.

Sewage.

Water.

Mode of life.

Moral causes.

Previous diseases, or

Accidents.

HISTORY—EARLY SYMPTOMS.

First signs of ill-health.

Pains or tenderness in

Groin, or

Pubic region.

Vaginal fulness.

Bearing down of uterus.

Pressure on bladder.

Pain, numbness, or weakness of leg.

Constipation.

Fulness or pain in breasts.

Nausea.

Symptoms worse periodically?

Increase in size.

Discovery of tumour.

Early treatment.

HISTORY—PROGRESSIVE SYMPTOMS.

Rate of enlargement.

Movements felt?

Changes in situation.

Aggravation of early symptoms.

Dyspnœa.

Tympanites.

Febrile attacks.

Cyst inflammation.

Peritonitis.

Ascites.

Discharges through { Uterus. / Vagina. / Bladder. / Bowel. / Abdominal wall.

Spontaneous rupture of cyst?

Treatment.

Date of any tappings, with nature

and quantity of fluid removed.

DIAGNOSIS.

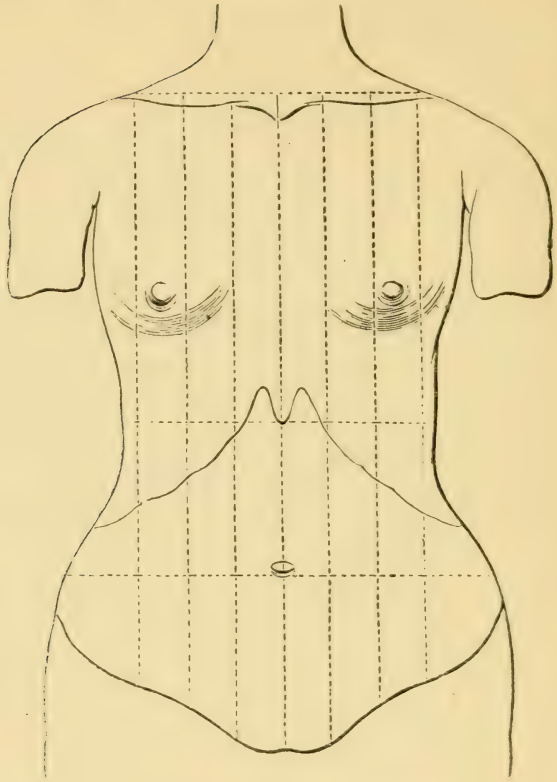
PROGNOSIS.

Probable duration of life if left alone to palliative treatment.

GENERAL TREATMENT.

MEDICAL OR SURGICAL TREATMENT

PROGRESS.



RESULT OF TREATMENT.

OPERATION.

Date.

Where performed.

Names of assistants and visitors.

Anæsthetic administered by

Nurse's name.

Incision, situation.

Extent.

Adhesions.

Tapping of cyst, or

Removal of tumour.

OPERATION.

Pedicle, size and length.

„ Relation to uterus.

„ How secured.

Hæmorrhage.

Opposite ovary.

Uterus.

OPERATION.

CLOSURE OF WOUND.

OPERATIVE PECULIARITIES.

PREVIOUS DIAGNOSIS COMPARED WITH OPERATION.

DESCRIPTION OF TUMOUR.

Quantity of fluid removed.

Weight of cysts, or of

Solid matter removed.

AFTER-TREATMENT AND PROGRESS.

[NOTE.—*Daily observations on the Pulse, Respiration, Temperature, Urine, Perspiration, &c., may prove of great interest, when compared with meteorological observations taken for a few days before and after the operation, especially with regard to Ozone and Antozone.*]

Date	Hour	Condition, Remedies, &c.	Temperat.	Pulse	Respiration

In each Note-book a whole page is left for the description of the tumour, and three pages are ruled in this way. Then another page is given for the termination or result of the operation, and a few blank pages are left for the subsequent history of the patient in each separate copy of the Note-book. I believe that most surgeons who have to treat cases of ovarian and other abdominal tumours will find one of these Note-books a very convenient form for the history of each case; and I am glad to hear that it is already in use on the Continent, having been translated into French by Dr. Boddaert, of Ghent, and published in Ghent and Paris.

CHAPTER VIII.

THE MEDICAL TREATMENT OF OVARIAN TUMOURS.

I do not say that medical treatment is of very little use in cases of ovarian tumour, simply because I am a surgeon and can remove the disease. But on looking over the medical literature of the subject, one finds the keynote of this chapter always the same—hopeless impotence. Of course, among the obscure writers or the vain seekers after notoriety, there is the usual jangling discordance of ignorant vaunting of this or that remedy, which gives as little pleasure or as much disgust as the Chinese part of a concert. But the dicta of the great authorities have a melancholy accord, curiously modulated by the circumstances or temperament of the speaker. Hunter, while frankly admitting the inutility of the medical science of his day, turns with prophetic expectancy to the sister art of surgery. We have seen how pathetically such a man as West resigns his patient, and deplores the uselessness of his interference. The cautious, investigating, and practical mind of Watson, compelling him honestly to confess that he is 'unable to reckon one single instance of success,' leads him at the same time to urge that we are bound to try what medicine can do in such cases, since, as some have done well, 'we scarcely know how or why,' it is still possible that we may, in some way or other, succeed again. On the other hand, the dogmatic Simpson, having observed and demonstrated the hurtful and injurious influence of experimental physic, authoritatively says: 'Be very chary in the administration of drugs, and especially of strong and heroic drugs, in cases of multilocular ovarian dropsy,' and adds, that one of the great and difficult lessons in practice is to learn 'to know when to stay and withhold your hand, and to keep yourself from injuring your patient by over-confidence in medicine, and by the too great use of physic.'

British experience is echoed from the Continent. Neither

climatic influences, nor constitutional peculiarities, seem to assist the physician in his efforts at cure. One might expect something different from the impetuous science of the South, acting upon the warm-blooded victims of ovarian disease, in a climate whose morbific and curative alternations are almost phantasmagoric, or from the persistent therapeutical batteries and sieges of the North, opposed to the passive resistance of phlegmatic habits. But on the scale of medical success the index stands nearly everywhere at zero. If Courty at Montpellier thinks that oxide of gold has put him two cases in advance of Sköldberg at Stockholm, Boinet at Paris looks into the matter and comes to the conclusion that, 'Malgré l'estime bien grande que nous avons pour la science de notre savant confrère M. Courty, on doit attendre que d'autres faits mieux diagnostiqués viennent montrer l'efficacité de l'oxyde d'or dans les kystes de l'ovaire.' Kiwisch is obliged to be content with a simple symptomatic treatment; Engelmann pointedly declares that 'there is as little benefit to be expected from the Kreuznach waters as from any other medical treatment;' the high transcendentalism of Berlin admits of no specifics; the plodding nihilism of Vienna only fertilises the field of ovarian pathology; while at St. Petersburg professional and artistic skill expend themselves in the most elaborate operational illustration. The word ovariotomy is positively magnetic at New York, and in the land of McDowell, who would think of anything short of the radical cure by operation of native origin? So at last we are reduced medically, as Dr. West says, to the consideration of two classes of cases, the first of which *may* be let alone, and the second which *must* be let alone; a third presenting itself in a form which justifies or absolutely requires interference, and that interference necessarily operative.

The sum of medical doctrine therefore on the subject amounts to this: palliate where you can; do no mischief where you cannot. The general state of health of the patient is obviously the first consideration; every attention is to be paid to it. All matters of diet, hygiène, tonics for the body, and consolation for the mind are to be regulated and administered under the conviction, that whatever tends to support the strength and cheer the spirits of the patient, does as much

as can be done in arresting the progress of a disease which, in its essentially parasitic character, flourishes under despondency and preys upon weakness. Though these cases are not utterly hopeless, and do sometimes spontaneously come to a standstill, yet when steady progress can be observed from time to time, it is better at once to put aside the old presumptuous talk about deobstruents, discutients, evacuants, and such like delusively promissory inanities, to disabuse the mind of vain expectations, to seek temporary relief of urgent symptoms by rational expedients, and either to encourage a buoyant anticipation of ultimate rescue by operation, or to lead the patient by degrees into the usual quiescence of confiding resignation to the inevitable, by the adoption of the tranquillising motto, *Cede Deo.*

The local miseries which we have to alleviate mostly arise from pressure or congestion. The due action of the bowels and bladder are interfered with, the veins are pressed upon, and œdematous swelling of the extremities shows itself, the area of the chest is encroached upon and breathing is made difficult, a teasing cough supervenes from nerve irritation, or the heart is embarrassed and the brain action enfeebled. Common sense will suggest the fitting choice of sedatives or stimulants, aperients or enemas, the use of the catheter, changes of position, the application of bandages or mechanical supports, and the possibility of relief sometimes to be obtained by manually shifting the position of the tumour when it is low down or impacted in the pelvis.

The fact that vascular excitement and congestion aggravate every symptom, naturally enforces in a question of matrimony the Polichinellian advice, 'Don't;' and as naturally enjoins, if not abstinence from, at any rate the utmost possible moderation in the use or permission of connubial rights. I shall have by-and-bye to discuss what must be done if pregnancy should unfortunately happen; at present I am content to urge that in all such cases caution should be given to avoid as much as possible the chances of it—*Concubitus sine Lucinâ*, if needs must.

But, independently of the troubles incident to the ordinary course of the disease, accidents will happen. The patient may get some local injury from a blow or a fall, or she may be

functions tolerably well, surgical treatment is seldom called for. It is only a projected marriage, or a necessary voyage, or some such family circumstance, that may justify or render expedient earlier resort to surgical aid. Under ordinary circumstances the surgeon would not interfere until an ovarian tumour either distressingly deforms a patient, or seriously impedes her locomotion, or prevents the free action of heart or lungs, or obstructs the circulation through the large veins of the abdomen, or by deranging the digestive organs leads to emaciation and weakness, or by its pressure causes pain, loss of rest, or mechanical obstruction to bladder or rectum. Under these conditions the size, nature, and connections of the tumour must guide us in the selection of one or other of the following methods of surgical treatment:—

1. Simple tapping through the abdominal walls.
2. Simple tapping through the vagina.
3. Simple tapping through the rectum.
4. Tapping followed by pressure.
5. Tapping and the formation of a permanent intra-peritoneal opening in the cyst wall.
6. Tapping and the formation of a permanent opening through the abdominal wall, the vagina, or the rectum.
7. Incision.
8. Tapping followed by injection of iodine.
9. Ovariotomy.

CHAPTER IX.

ON THE TREATMENT OF OVARIAN CYSTS BY ABDOMINAL TAPPING, VAGINAL TAPPING AND DRAINAGE, INJECTION OF IODINE, AND INCISION.

As experience has increased and the mortality after ovariotomy has diminished, professional opinion has been unsettled as to the use or propriety of tapping ovarian cysts. Some writers have gone so far as to assert that it is an operation which ought to be completely abandoned. Stilling, for example, in his work on the 'Extra-Peritoneal Method of Ovariotomy,' says, p. 161, that '*No surgeon should ever puncture an ovarian cyst. Tapping is a crime.*' He adds '*Never tap.* Ovariotomy becomes more difficult the oftener a patient has been tapped before it, and the patient is made worse by every tapping.'

Few surgeons here would go so far as this, but there are many who object to tapping on two grounds—first, that it is dangerous in itself and can only be of temporary utility; and, secondly, that it is likely to be followed by adhesions or other conditions which add greatly to the danger of subsequent ovariotomy.

In considering the objection to tapping on the ground of its danger, as compared with the danger of ovariotomy, some writers appear to me to have fallen into a great error. They take a certain number of cases of ovarian disease, and say that so many patients died after one tapping, so many after five, six, or ten, and conclude that tapping is a very fatal operation. I have heard it gravely asserted that it is a more fatal operation than ovariotomy, because after ovariotomy three-fourths of the patients recover, while after tapping, sooner or later, they all die. But the very important distinction is overlooked

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between an operation which either cures or kills, and one which only fails to save life, or kills only under most exceptional circumstances.

It is seldom that a surgeon is called upon to perform ovariotomy in order to save a patient from imminent death. But this does occasionally happen. Dr. Wiltshire and Dr. Watson have published a case where a woman, who was dying from bleeding into an ovarian cyst, was saved by immediate ovariotomy. I have been sent for twice to operate under similar circumstances, but both patients were dead before I arrived. In both large veins had burst, and some pounds of blood were found inside ovarian cysts. If, in any of these cases, the death of the patient had followed ovariotomy, it could hardly be said that this operation had killed the patient; it had only failed to save life. So, if a patient be near death, poisoned by an ovarian tumour in a state of gangrene from twist in the pedicle, or by the fetid contents of a suppurating cyst, ovariotomy, if performed unsuccessfully, can only be said to fail in saving life—it cannot be said to kill. Yet I have operated successfully under such desperate circumstances; and more than once when rupture of a cyst into the peritoneal cavity had been followed by diffuse peritonitis. In any such case, ovariotomy must be compared with trephining, tracheotomy, herniotomy, or the ligature of some large artery in a case of wound or burst aneurism, or primary amputation of a limb in compound fracture. It is not the operation which is the cause of death, but the disease or accident from the effects of which the patient is not saved by the operation.

But such cases as those just alluded to must be very rare exceptions to the large majority in which ovariotomy becomes the subject of consultation. There is generally as much time for discussion as in the parallel case of lithotomy in the male adult. And in both cases the responsibility of operating with the full knowledge that, if the patient be not saved by the operation, he or she is killed by it, must be fairly faced. It is true that death would almost always be caused by the stone or the ovarian tumour, but it might be at a distant period, and if death follow the operation in a few days the operation must be almost always the cause of death.

Tapping stands on a totally different ground. As a rule,

when a patient dies after tapping, it is not because tapping has hastened her death, but simply has not succeeded in saving her life. Her life may have been prolonged by repeated tappings, but at last she dies worn out by the disease.

Tapping may be practised—first, through the abdominal wall; secondly, through the vagina; and, thirdly, through the rectum. Whichever of these methods may be selected, it may be trusted to alone, or it may be followed by pressure, or by drainage, or by the formation of a permanent opening, either in the cyst wall only, with the object of establishing a constant communication with the peritoneal cavity, or through the abdominal wall, vagina, or rectum. In the one case the fluid passes into the peritoneal cavity and is absorbed, no external opening being kept up; in the other a fistulous external opening is kept up until the cyst ceases to pour out fluid and becomes obliterated. In any of these cases the process may be assisted by pressure; and in some tapping may be followed by the injection of iodine.

1. *Tapping through the abdominal wall* was formerly practised with the patient sitting in a chair, a pail between her legs, an assistant on either side of her, keeping a sheet, or long towels, so tightened round the abdomen by pulling at the ends, that the escape of the fluid was supposed to be assisted, and the fainting of the patient prevented. A hole in the sheet, or a space between two towels, left room for the passage of the trocar. The operator, standing in front of the patient, used the trocar like a dagger, stabbing with considerable force. A good deal of discussion arose at one time as to the propriety of dividing the skin and fascia with a lancet, before using the trocar. Some thought it unnecessarily prolonged the operation, others thought it spared the patient the shock and pain of a forcible stab. Any way the operation was a very distressing one. The fainting of the patient was by no means uncommon; she suffered from exposure and shock, her clothing was often wetted by the fluid, and she was taken back to bed frightened, wet, cold, faint, and exhausted. No doubt some of the dangers of tapping depended upon this clumsy method of proceeding. It is difficult to understand otherwise that the mortality after tapping could possibly have been as high as many writers have estimated it. Simpson's calculation was that the mortality

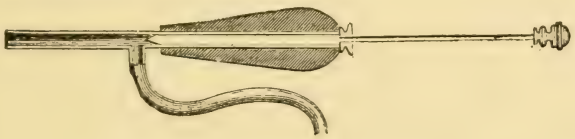
after first tappings was not less than one in six. Under the present simplified mode of tapping, I very much doubt if it is as much as one in sixty. I believe it is considerably less than this in my own experience. I have removed 115 pints of fluid from a patient at one tapping, without the slightest sign of faintness, and without wetting either the linen of the patient or the bed clothes, and without disturbing her position in the bed. I constantly remove 30, 40, or 50 pints of fluid from patients as they lie on the side in bed, and they are only conscious of the relief afforded by the removal of pressure. It is quite unnecessary to take the patient out of bed; if she has been moving about she should go to bed, and should lie on one side near the edge of the bed, so that the abdomen projects over the edge. As a rule, the linea alba is the preferable site for puncture, but any hard portions of the tumour should be avoided, and the most elastic or distinctly fluctuating points of the tumour selected. Before puncturing, great care should be taken by palpation and percussion to ascertain that no intestine is lying, or adhering, between the cyst and the abdominal wall, at the point selected for the tapping; and any visible superficial veins should be avoided. It is certainly advantageous to puncture the skin with a lancet before using the trocar, and if the patient is very sensitive to pain the seat of puncture may be frozen by ether spray.

The trocar has been greatly improved of late years. The old instrument was so short that, if the abdominal wall was thick, the trocar never reached the cyst, or it may just have punctured the cyst, and the canula was too short to follow it. In the first case no good, but no harm, was done; in the second the results were dangerous or fatal. The punctured cyst poured out its contents into the peritoneal cavity, and dangerous symptoms or death followed, the danger arising not necessarily from the tapping, but from the bad way in which it was done.

Great difference of opinion has been expressed as to the danger or harmlessness of admitting air into an ovarian cyst while the fluid is escaping. Some writers have argued that it can do no harm. My own opinion, founded upon the few cases where I have been quite sure that air has entered, is very decidedly in accordance with those who assert it to be

frequently followed by decomposition of the fluid which remains in the cyst, or is secreted soon after the tapping, by cyst inflammation, and the fever which accompanies it. I therefore regard the improvement in the trocar which provides against the entrance of air into the cyst, during the escape of fluid, as an important element in the diminution of the mortality after tapping. We are indebted to Mr. Charles Thompson, of Westerham, for introducing the simplest and most effectual mode by which this object can be attained. This instrument was described in the 'Medical Times and Gazette,' March 27, 1858, as a 'new trocar for paracentesis thoracis.' In his own words, 'it consists of a cylindrical silver canula about four inches long, into which opens at near its middle a short silver conducting tube of the same calibre, to

which a piece of india-rubber tubing about a foot long is attached by a screw. In this canula plays a solid steel piston, with a trocar point, its body being of such length that, when fully pushed forward, as in the above figure, its point protrudes sufficiently from the canula, and its other extremity seals the entrance of the conducting tube; and, when fully withdrawn, as in this figure—



it retires so far as to open the conducting tube. This piston must fit the canula so perfectly as to be air-tight when greased. The little cap of the canula unscrews to admit of the removal of the piston for greasing or cleaning. The outer half of the canula is mounted in a solid wooden handle to give a firm grasp of the instrument.

'The mode of using it is as follows:—Having well greased the piston, draw it back, as in the second figure, and, placing the end of the elastic tube into a basin of water, withdraw the

air from it by suction at the end of the canula, and when the water reaches the lips push forward the piston. The elastic tube is now filled with water, which cannot escape, and the instrument is ready for use. When it is plunged into the chest, pull back the piston so as to open the conducting tube. When the fluid follows, and directly it meets the water in the tube, a syphon is formed. The end of the tube should be kept under fluid during the operation. If it is required to stop the flow either during a fit of coughing or to change the receiving vessel, it can be done instantaneously by just advancing the piston sufficiently to cover the conducting tube.'

As soon as I read this description of the new trocar, I saw how useful it would be, both in tapping ovarian cysts and in ovariotomy, and I had instruments made with canulas of different lengths and calibre, suitable for both purposes, and continued to use them for some months, and found that great advantages were gained by the use of the instrument. Admission of air was prevented, the syphon action assisted in keeping up a continuous flow of fluid, while the escape could be stopped at any desirable moment. If the tube or canula became blocked it was easily cleared. The fluid was conveyed into the receiving vessel, while the patient was kept perfectly dry, not alarmed by the splashing of the fluid, and not disturbed by the changing of the basins, which was so troublesome when the old instrument was used. To some a practical improvement of this kind may appear of small value, but anyone who does much real work at the bedside will, I think, agree with me in the opinion that Mr. Thompson, by this simple and ingenious contrivance, has proved himself to be worthy of his hereditary position, and of the estimation in which his family have been held for generations in the county of Kent.

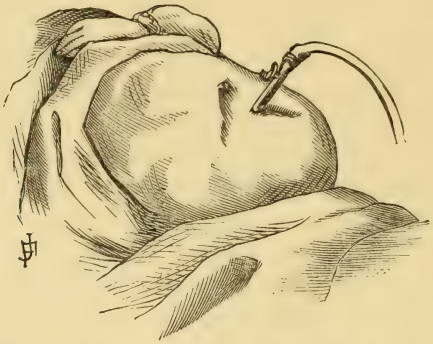
While still desirous to carry on the principle of the syphon, as adapted to the trocar, I became anxious to avoid the momentary delay, between the introduction of the trocar and the escape of the fluid, while the piston was being withdrawn. I was led to this by observing that, when using the large-sized instrument in ovariotomy, there was sometimes a rush of fluid between the cyst and the outside of the canula before the piston could be withdrawn, and it was evident that the same

thing might occur during ordinary tapping. I was therefore anxious to make the piston hollow, but, after two or three trials, it occurred to me that something like a steel pen sliding in the pencilcases in ordinary use, might be a more convenient mode of effecting the object in view. I first carried out this idea in an instrument of the size for ovariotomy, adding, to the outside of the canula, grooves upon which the cyst could be tied as it became lax. This instrument was described in a paper read before the Royal Medical and Chirurgical Society. Modifications which I have since made in this instrument will be described in the chapter on Ovariotomy. When the instrument is made of the size for simple tapping, the canula is perfectly smooth. A lancet puncture is first made through the skin, and the instrument is then easily thrust into the cyst. Fluid escapes immediately, and the point is at once withdrawn to prevent injury to the cyst as it contracts. It is important that the edges of the canula should not be thin, but perfectly smooth and well rounded off. There would otherwise be danger of injury to large veins on the inner surface of the cyst; and the maker should be careful, in sharpening the cutting end of the hollow trocar, to leave one half of the lips quite blunt. If sharpened all round it would act as a punch, and cut a circular hole in the skin. I have seen a tube blocked in this way, and I have more than once seen a round piece of skin floating in the fluid, or so nearly detached after the canula was withdrawn, that it was better to cut it away. If the instrument is properly finished, only a semilunar cut is made in the skin and cyst, which closes much more readily than the triangular puncture made by the old trocar.

Instead of the india-rubber tube, it is quite easy to fix to the end of the canula an ordinary india-rubber enema syringe, by which more powerful exhausting suction can be brought to bear upon the contents of the cyst than can be obtained by the syphon tube; and if it be desirable to wash out the cyst, or to inject iodine or any other antiseptic into it, this can be readily done by reversing the syringe without removing the canula.

When using this syphon trocar it is not necessary to fill the tube with water, as Mr. Thompson directs, if care be taken so to introduce the instrument that the point passes into the fluid at a lower level than the commencement of the tube,

as shown in this sketch. Air will not descend except under strong suction, or into a vacuum, and there is no



fear of air passing up the tube and down the canula into the cyst. The instant the canula enters the cyst, fluid rushes into it, pressing the air before it, and if the tube be properly mounted so that it does not bend or narrow the canal, the tube, which should be about three feet long, at once becomes the long arm of a syphon. The suction power of this long column of fluid is so great, that the air can be heard to be drawn bubbling into the tube, even through the well-fitting bayonet joint provided for the withdrawal of the point of the instrument. It is better to keep the end of the tube under the fluid when the cyst is nearly empty, to avoid any accidental drawing inwards of air as a patient makes some deep inspiration or expiration, leading to a kind of vacuum within the abdomen ; and in withdrawing the instrument it is always well to press the abdominal wall well down upon the cyst, and with the finger and thumb of the other hand so to press the abdominal walls together behind the escaping canula as to prevent any entrance of air.

Should any bleeding follow the removal of the instrument and not be stopped by a little pressure, a harelip pin should be passed completely across the opening, deeply enough beneath the skin to compress any injured vessel. Two or three turns of silk twisted round the pin make sufficient pressure to stop any bleeding. It is not sufficient simply to bring the edges of the skin together with a pin ; this might only conceal dangerous internal bleeding. One of my neigh-

hours lost a case within a few hours after tapping; upwards of five pints of blood, which had escaped from a varicose vein, having been found in the peritoneal cavity. The vein ran directly in front of the peritoneum, immediately beneath the linea alba, from the umbilicus towards the liver. A pin through the whole thickness of the abdominal wall would have compressed this vessel. Whenever I am doubtful if a cyst has been completely emptied, or there is some escape of fluid after the removal of the trocar, the comfort of the patient is greatly increased by closing the opening with a harelip pin and twisted suture, but the pin need not be passed so deeply as in case of bleeding. I was led to adopt this practice from the remark, made to me by a very able and experienced hospital surgeon, upon a case where oozing after tapping was going on. He said, 'When they ooze they always die,' so I determined that they should not ooze unless I wished to drain. In ordinary cases a pin is not necessary, a small pad of lint and a strip of adhesive plaster being quite sufficient to cover the opening, and the abdomen should be supported by an ordinary binder.

In order to prove that simple tapping through the abdominal wall is occasionally followed by a radical cure, the following cases are important:—

In July, 1863, an unmarried domestic servant, thirty years of age, came from Liverpool to the Samaritan Hospital. The abdomen was so distended by a unilocular cyst that the ensiform cartilage was pushed forwards. I decided to tap this cyst, and if I found the contents were limpid to do no more, but if viscid fluid escaped or secondary cysts were found, to perform ovariotomy at once. She was only tapped, and soon after returned to Liverpool able to take another situation, and was very well for about three years after the tapping. The lady who sent her afterwards wrote to me 'that she had died in Manchester, I cannot remember from what complaint, but nothing connected with the disease.'

In April, 1865, an unmarried lady, twenty years of age, was sent to me by Dr. Miller, of Southsea. The whole abdomen was distended by a single cyst, which had been forming for about eighteen months. The lungs were beginning to suffer from pressure, and I advised immediate tapping, stating that

the case might prove to be one of the exceptional instances in which tapping not only relieves but cures. I removed fourteen pints of a limpid fluid with a slightly greenish tint. About four ounces were preserved in a bottle for examination. On removing the stopper bubbles of carbonic acid arose as from Seltzer water. The reaction was strongly alkaline. On boiling a small quantity in a test tube, no change was perceptible until after the addition of nitric acid, when an abundant white precipitate appeared, and brisk effervescence took place. The precipitate assumed a faint greenish tint, and the supernatant fluid was absolutely colourless. Nothing could be discovered in it by microscopic examination. Probably the chief alkali present was carbonate of soda, for when the fluid was added to spirit it burned with a very yellow flame. The patient returned to the country nine days after the tapping, and remained well for about six months. Then Dr. Miller informed me that, upon the termination of one of her menstrual periods, symptoms of peritonitis showed themselves, but yielded in about twenty hours to calomel and opium. With this exception she has remained perfectly well, and without any sign of refilling of the cyst, since the tapping. I heard of her in 1872 as quite well.

In July, 1865, I saw an unmarried lady, twenty-nine years of age, with Mr. Fox, of Weymouth; made the diagnosis of a non-adherent single cyst, advised one tapping, and removed thirty-two pints of fluid, as clear as distilled water, on July 20, 1865. Immediate relief followed the tapping, and in February, 1866, Mr. Fox told me that there had been no refilling, and that she had remained remarkably well and active. The history of this case, both before and after the tapping, is curious. In June, 1860, although she was very large, she was dancing, gave a sudden scream, became faint, and collapsed. Mr. Fox gave stimulants freely. Next day she began to pass enormous quantities of fluid from the urethra, estimated at from thirty-five to forty-five pints in three to four days, until the abdomen became quite flat; and Mr. Fox related the case in the 'British Medical Journal,' as a case of spontaneous cure of ovarian cyst. But in October, 1863, she began to enlarge again, and continued to increase until I tapped her in July, 1865. After

this tapping she remained well till the end of 1866; then she began to refill, and during the summer of 1867, whilst getting into an omnibus at Portsmouth, she fell and struck the abdomen violently. Soon afterwards profuse diuresis set in, and she was rapidly reduced in size, as before. In April, 1869, Mr. Fox wrote:—'She continues quite well; there has been no tendency to refill since she fell at Portsmouth.' I heard of her this year as continuing well.

In March, 1865, I saw a widow, forty-two years of age, with Dr. Greenhalgh, suffering from an ovarian cyst, which filled the abdomen, and could be felt low down in the pelvis pressing the uterus forwards and upwards. I emptied the cyst, by tapping, on March 25, 1865. The fluid was dark brown in colour and rather viscid. I fully expected that it would soon form again, but in August she wrote to say that 'there were no signs of the tumour filling, and Dr. Everett could not detect any fluid whatever.' In April, 1869, she wrote:—'My health has very much improved. I have had no return of the disease. I am in better health than I have been for many years past. In 1867, I married again, and had the advantage of residing in a most healthy watering-place in the North of England, where in a few months I gained flesh and strength.' I have reason to believe that this patient remains quite well.

I have selected these cases as the earliest in my note-books, but I have had several other cases under observation for shorter periods where single cysts, after having been emptied of limpid contents, have remained without any signs of refilling, and the patient has continued in good health. In one of the earliest cases, which was published many years ago by Mr. Cooke, I tapped the patient in the Samaritan Hospital only the day before she was married. She became pregnant at once, and has had several children since, without any sign of refilling of the cyst. Mr. Cooke supposed that the pressure of the increasing uterus had some share in preventing the cyst from refilling.

In order to weigh the value of the various objections to tapping, I have gone over the records of the five hundred cases of ovariotomy which I have now completed, and have arranged in the following table the cases where tapping had never been

practised, and where it had been performed from one to eighteen times :—

Cases	Number	Recoveries	Deaths	Mortality per cent.
Never tapped . .	235	180	55	23·4
Once tapped . .	140	107	33	23·57
Twice tapped . .	49	32	17	34·69
Three times tapped .	32	25	7	21·87
Four „ . .	15	10	5	
Five „ . .	3	2	1	
Six „ . .	6	3	3	
Seven „ . .	3	2	1	
Eight „ . .	5	4	1	
Nine „ . .	4	3	1	34·
Ten „ . .	3	3	0	
Eleven „ . .	1	0	1	
Fifteen „ . .	1	1	0	
Sixteen „ . .	2	1	1	
Eighteen „ . .	1	0	1	
	500	373	127	25·4

Two hundred and sixty-five of the five hundred patients upon whom I have performed ovariotomy had been tapped previously, from one to eighteen times. One hundred and ninety-three of these tapped patients recovered, and seventy-two died, giving a mortality of 27·17 per cent.

It may be seen that the general mortality of the 500 cases is 25·4 per cent., and that 235 patients, or nearly one-half, had never been tapped. In them the mortality is 23·4 per cent., just 2 per cent. less than the general mortality. In other words, the mere fact that a patient has or has not been tapped (so far as can be judged from 500 cases in the hands of the same operator) does not affect the result of the operation by more than 2 per cent. Indeed the mortality

of the patients not tapped, though less by about 10 per cent. than that of the patients who had been tapped twice, is greater than that of the patients who had been tapped once and three times. Thus 140—or rather more than a fourth—had been tapped once, and the mortality was 23·57 per cent. Of 32 who were tapped three times, the mortality was 21·87 per cent. Of the 49 who were tapped twice, the mortality was nearly the same as that of the group of cases tapped from 4 to 18 times, namely 34·69 per cent., or about 1 in 3.

It may be taken then as almost certain that the mortality of ovariotomy is but little affected by tapping—that the fact of a patient not having been tapped, or having been tapped very often, is by itself of little or no value in prognosis. I have stated elsewhere that such adhesions as are apt to follow tapping have no appreciable effect upon the mortality after ovariotomy; and I can now add that in some of the patients who had been tapped most frequently there were no adhesions, and there were firm adhesions in some who had never been tapped.

Enough has assuredly been adduced to warrant the acceptance of the following propositions:—

1. That one or many tappings do not increase considerably the mortality of ovariotomy.

2. That tapping may often be a useful prelude to ovariotomy, either as a means of gaining time for a patient's general health to recover, or of lessening shock, by relieving her of the fluid a few hours or days before removing the solid portion of an ovarian cyst; and

3. That when the syphon-trocar, which I brought before the profession in 1860, is carefully used in such a manner as to prevent the escape of ovarian fluid into the peritoneal cavity, and the entrance of air into the cyst, the danger of tapping is extremely small.

Tapping through the vagina is much more liable to be followed by inflammation of the cyst than tapping through the abdominal wall, because it is not easy to prevent the entrance of air. We should always endeavour to avoid this accident by attention to the level of the canula, but the attempt does not invariably succeed. The operation of tapping through the vagina is selected, not so much with the intention

of simply emptying the cyst, as for the chance that, should the fluid escape by the opening as fast as it is secreted, the cyst may gradually collapse, and the puncture close. This favourable result, however, is seldom secured. As a rule, air enters the cyst, the opening fills up, and the fluid remaining in the cyst, or that freshly secreted, putrefies. Suppurative inflammation of the lining membrane of the cyst comes on, and is accompanied by a low form of exhaustive fever or pyæmia, which can only be relieved by making and maintaining a free outlet for the discharge. The frequency of these consequences should make tapping through the vagina an exceptional practice. But it may be adopted in cases where an ovarian cyst is bound down in the pelvis by adhesions, and it is necessary to relieve the distress caused by pressure on the bladder and rectum. The puncture should then be made where the fluctuation is most evident, but as near the median line as possible. The canula, or an elastic catheter, may be left in the cyst, though it is safer practice either to introduce a wire seton, or a drainage tube, through part of the cyst, or to make an incision as the canula is withdrawn and insert a pledget of iodised lint, or a laminaria tent, so as to keep the opening dilated, and make sure of the free and immediate escape of any fluid that may be secreted.

Many years ago, before I had much experience in ovariotomy, I saw a lady with Dr. West, whose case appeared to us both to be a very favourable one for the operation; but as fluctuation could be distinctly felt through the vagina, we both thought that tapping by the vagina might be less hazardous than ovariotomy, and I accordingly emptied the cyst by vaginal tapping. Complete relief was afforded, but only for a short time. Symptoms of suppurative inflammation of the cyst showed themselves, and much purulent matter was removed at the second tapping. The patient went to Bristol, and was most ably attended there by Mr. Cross, the discharge being persistently kept up; but she died in about a year. The detailed notes of the case have been lost, but I have not forgotten the impression which it made upon me. The case was a most favourable one for ovariotomy, and vaginal tapping was only selected because it was thought to be a less hazardous operation.

In the following case, vaginal tapping was completely successful in leading to a perfect cure. In June, 1861, I was consulted by a lady, thirty-two years of age, on account of an abdominal tumour which extended just above the umbilicus, rather more to the left than to the right side, and which completely filled the pelvis. She had been married ten months when she consulted me, and two months before marriage she had consulted an eminent physician who said that she had a small fibroid tumour of the uterus, that she might marry, but that she was not likely to have children. Soon after marriage the tumour increased, particularly towards the left side, and pressure on the bladder led to retention of urine and catheterism. In March, Dr. Ferguson said it was a fibrous tumour which had better be left alone. Soon afterwards, Dr. Waller said she had both an ovarian and a fibrous tumour, and two days before I saw her Mr. Baker Brown said she had a fibrous tumour, which he proposed to 'gouge.' My first impression was that the tumour was ovarian, closely attached to the uterus, but not a uterine tumour. I saw her occasionally during the next six months, the abdominal portion of the tumour increasing, and the pelvic portion becoming harder and pushing the uterus closer to the symphysis pubis. In March, 1862, vomiting and other symptoms having become distressing, vaginal tapping was agreed upon in consultation with Dr. West. On March 20, I passed a trocar into the most prominent part of the swelling in the posterior vaginal wall. About ten ounces only of thick bloody fluid came away. The next day she was pretty well. On the 22nd, the catamenia came on with sickness. On the 25th, vomiting was increased, but was relieved next day after iced champagne, and using turpentine injections. On the 27th, a very copious vaginal discharge came on with some odour. On April 5, Dr. Bunce, of Woodford, wrote: 'The discharge still continues, and has done so all the week; she has been very weak at times and faint, quite believing she should die; but she takes a good deal of nourishment now, and I hope is progressing favourably.' On the 7th, he wrote again: 'The discharge has continued till this morning, thinner and lighter in colour, and excessively fetid; there is now but little discharge, with less fetor; there is considerable diminution in the size of the abdomen, which is soft and flaccid except on

the left side, where there is a hard lump. Sickness has ceased, she takes plenty of nourishment, and is in good spirits.' On the 11th, I found her up and pretty well. There was still some swelling in the left iliac region, but all the rest of the abdomen was clear on percussion; discharge had almost ceased, and the uterus was nearly in its normal position, but large and low down. She went on well till the 16th, when fetid ovarian fluid again began to escape by the vagina. She was sick and weak for some days, but went to Brighton in May, and returned in June, a little discharge still continuing. In July, some abdominal swelling low down could still be felt, but she was in excellent health. In August, symptoms of early pregnancy showed themselves. In September, there was smart flooding, and apparently an abortion of about ten weeks. In October, there was excessive catamenial discharge, lasting six days. In the spring of 1863, she again became pregnant, and all through her pregnancy had occasional discharges from the rectum of what appeared to be ovarian fluid, but a healthy child was born on December 29, 1863, and Dr. West informed me that the labour was quite natural. A second child was born in 1865, and a third in 1866. Two other children have been born since, the last in May, 1870; and I saw her quite well in 1872, no trace of the ovarian cyst being perceptible.

In April, 1862, a married woman, thirty years of age, was in the Samaritan Hospital with an ovarian tumour, which occupied the whole of the left side of the abdomen, and could be felt by the vagina and rectum behind the uterus, quite filling up the pelvis. She had suffered considerably from the pressure of this tumour for about four years. On April 17, I tapped with Scanzoni's trocar behind the uterus, but only about a pint of ovarian fluid escaped. She left the hospital in a few days much relieved. I heard afterwards that vaginal discharge continued for a considerable period, and became purulent, that the abdominal tumour gradually disappeared, and that she regained good health. I have lost sight of her, and on writing to her address the letter was returned, marked 'Gone away.'

In August, 1866, I saw a young married lady with a circumscribed collection of fluid in the right iliac region. She was married in May, 1861, went to Ireland in the following September, was taken ill there with irritable bladder, scanty urine,

and difficu'ty in passing it; suffered a good deal during a voyage to India; and, on landing at Bombay in 1862, a basin full of 'white stuff like matter' came away by the rectum. After this she was well till December, 1865, when increase in the abdomen began as she was travelling in India, and continued slowly until I saw her. On August 14, 1866, I tapped with a very fine trocar just above the pubes, on the right side, and removed three pints of ovarian fluid with an exhausting syringe. Immediate relief was obtained, and she felt quite well till November. Then some pain and swelling began on the left side, just behind the left hip, in the same place that she felt it when going to India in 1862; but I could not detect any abdominal or pelvic tumour except a little thickening in front of the cervix uteri. After this she was occasionally treated by Dr. Priestley for dysmenorrhœal pains; and I did not see her again till March, 1868, when I examined her in consultation with Dr. Priestley. She then had an elastic tumour of about the size and situation of the gravid uterus of six months. The right side of the vagina was deeply depressed, pushing over the uterus to the left. Distinct fluctuation was perceptible from the abdomen to the vagina. We agreed to tap by the vagina, and drain the sac after the next menstrual period. On March 18, 1868, I introduced Scanzoni's trocar to the left of the uterus, and removed three and a half pints of clear ovarian fluid, leaving the elastic canula in the cyst and vagina. On the 19th and 20th, she was rather feverish. On the 21st, I injected some weak solution of iodine. On the 22nd, no discharge coming through the tube, I removed it. As it came away several ounces of fluid escaped, as if from Douglas's space rather than from a cyst. She was feverish, with a coated tongue and rapid pulse, and went on till the 27th without any vaginal discharge. There was increasing tension over the pubes, but with clear sound on percussion, as if air were in the cyst. Dr. Priestley succeeded in introducing a uterine sound through the vaginal opening. Some gas and fetid fluid escaped. On the 28th, I put in a vulcanite tube, and, with a syringe fitted to it, drew out several ounces of very fetid fluid with bubbles of gas. I repeated this on the two following days, the tube being left in the cyst, and free purulent discharge going on through it. On April 2, the nurse

accidentally pulled out the tube. In the afternoon I found that a full inch of the tube was broken off, and as it could not be found we feared that it might be in the cyst. On April 3, I put in a laminaria tent to enlarge the opening. On the 4th, I proceeded to remove the tent, but the string attached to it cut through the softened laminaria, and the tent was left inside the cyst. I tried to catch it with forceps, but could not; so I introduced a sponge tent in order to widen the opening still further. On the 5th, Dr. Junker administered chloroform, and I dilated the opening by the hysterotome; but neither with my finger, nor forceps, nor with the lithotrite, could I find the laminaria tent, and I supposed that the vegetable matter must have been softened and come away with the discharge. The cavity felt large, but so circumscribed that it was clearly a cyst and not Douglas's space. I put in one of Dr. Wright's steel expanding stem dilators. This remained for a fortnight, and I removed it on April 20. All that time fetid purulent discharge had gone on, more or less, with occasional pain and want of appetite, and something hard could be felt to the right side of the uterus as if the laminaria tent were still there. She went to Brighton, and called on me on May 14, on her return, much improved in health. The discharge had almost ceased; there was no abdominal swelling; but I could distinctly feel something hard close to the opening in the vagina and to the right side of the uterus. Fearing to do harm by attempting to remove it, if it were the tent, I advised her to go into the country. She wrote to me in June that she was gaining strength, but that the discharge continued yellowish and not offensive, and in larger quantities soon after the monthly periods. I did not hear of her again till Dr. Priestley wrote to me in January, 1869, saying 'Our old patient came to me, complaining of much discomfort, and copious discharge mixed with blood. I found some foreign body lying in the fistulous opening, and after a little trouble caught it with a pair of forceps. It turned out to be the missing laminaria tent, which must have been there since last March. It still retained its form, and although slightly fetid, was much less so than one might have expected. She was here again to-day, much relieved, and the aperture seems disposed to contract.' She soon regained good health, and I saw her in the summer of

1871 perfectly well, no sign of abdominal or pelvic tumour being discoverable.

In the following case vaginal tapping and drainage were followed by good health for three years, but the patient then died with symptoms of pyæmia and abscess of the liver. A married woman, thirty-six years old, was sent to me by Mr. Chesterman, of Banbury, and was admitted to the Samaritan Hospital in December, 1863. She had a tense, tender tumour on the left side of the abdomen, extending as high as the umbilicus. The anterior wall of the vagina was depressed, especially on the left side; the uterus was very high, so that it could scarcely be reached by the finger, and the bladder was pulled up with it. Catamenia quite regular. The symptoms had not been complained of more than six months. On January 4, 1864, I tapped in the middle line of the vagina and evacuated thirty ounces of green, albuminous fluid, sp. gr. 1025. A canula was left in the cyst and fixed there. She had a restless night; slight rigor and some pain the next day. On the 6th, iodine solution was injected through the canula night and morning; 7th, scarcely any pain, and the canula caused no annoyance. Two hours after the injection of iodine pain became severe, and was followed by profuse sweating; 8th, nothing having come through the canula since the iodine was injected, it was removed, and, after its removal, some greenish, albuminous fluid continued to drain away for the next two days. The discharge ceased, and she was pretty well till the 18th, but suffering occasionally from pain and feverishness. On the 18th, after an attack of violent pain and vomiting, profuse and very offensive vaginal discharge took place, and continued on the 19th. On the 20th, there was severe pain in the left shoulder, which continued on the 21st, but without sweating. On the 22nd, the pain in the shoulder subsided, and the discharge became less offensive; but from the 23rd to the 27th it was very free, purulent, and excessively offensive. She expressed a great wish to return home, and did so on February 2, improved in general condition, but with a very offensive discharge continuing. At the end of a month, Mr. Chesterman wrote that she was 'getting fat and strong, and saying that she felt better than she had been for the last ten years.' I heard of her again in June, 1865, when she said she had remained well till a

month before, when she had some fetid discharge, which lasted for three weeks, and then ceased. The uterus felt fixed, but there was no other sign of disease. On November 15, 1867, Mr. Pemberton, of Banbury, wrote to say that this patient had died after an illness of about ten days. 'She had been exceedingly well for twelve months or more prior to this attack; the tumour had become so small as scarcely to be felt through the abdominal parietes; and she rarely had any pain, but occasionally a little uneasiness followed by a discharge from the vagina, when all felt well again. She had been out for many hours in the wet, and was seized with acute pain over the hepatic region, and great tenderness down the right side towards the hip. The tumour, you will remember, was on the left side; all her pain now was referred to the right side, immediately below the ribs; and, a day or two before death, there was œdema, extending from the hepatic region to the right thigh, limited to the right side only. Mr. Chesterman concluded from this, that there was some obstruction to the circulation, and probably abscess in the liver. I very much regret to add, that I was unable to obtain a postmortem examination.'

Whether a freer opening in this case might have prevented the re-formation of fluid or pus in the cyst is a question which suggests itself; and I may state that the impression left on my mind by what I have seen of vaginal tapping, leads me to the conclusion that simple tapping is more hazardous than tapping followed by drainage, and that drainage should be so complete that no re-accumulation of fluid can take place, the cavity being kept open until its walls collapse and unite, so that it is completely obliterated.

Tapping through the rectum has been supposed to possess some advantages over tapping through the vagina. It was said that there would be no constant discharge of offensive fluid, for any ovarian fluid which entered the rectum would be retained, just as a liquid motion is retained by the sphincter ani, and discharged when the patient pleased. But a dysenteric tenesmus has been occasionally observed, which has proved very distressing, and fatal inflammation has followed entrance of fæcal gases into the cyst. I had one such case with Dr. Priestley. We tapped an adhering cyst through the rectum, and the pa-

tient died some days afterwards of cyst inflammation. The cavity was filled with fæcal gas.

It was supposed that the objection to vaginal tapping from entrance of air into the cyst would be guarded against in rectal tapping by the contraction of the sphincter ani. But the entrance of fæcal gas into a cyst would be quite as likely to occur, and would probably be more injurious than the entrance of atmospheric air in vaginal tapping.

Injection of iodine.—In his work on 'Diseases of the Ovaries,' published in 1867, Boinet quite ignores simple tapping as a means of cure, even of unilocular ovarian cysts, though it must be admitted that, in the experience of others, such a result has happened often enough to justify our giving a patient, under favourable circumstances, the chances of such an easy mode of escape from her disease. Naturally enough, having been the first, in 1847, to introduce and to practise the injection of iodine for the radical cure of ovarian tumours of a certain class, he a little inconsistently not only points out the inutility of simple tapping, but somewhat enlarges on the danger of the operation in damaging the general health, in accelerating the reproduction of fluid and the growth of the cyst, in the formation of adhesions, and the consequent aggravation of the perils of ovariotomy should the patient survive to require it, and in very often killing her; or, as he somewhat periphrastically says, leading directly to '*des accidents mortels*.' At the best it can only be a palliative measure, and the repetition of it is, in his opinion, merely equivalent to abandoning the patient and throwing away, in complaisance to '*la médecine impuissante*,' the time for and chances of successful surgical treatment by ovariotomy or the injection of iodine.

He consequently reduces all ovarian tumours to two categories, those which must be removed, and others which may be cured by iodine injections. The tumours which must be extirpated are, of course, all the multilocular cysts, and such of the simple ones as have in them thick, ropy, albuminous contents, and cannot be closed after repeated iodine injections and tubular drainage. The class of simple tumours which may be cured by iodine comprises all those free, uncomplicated, unilocular cysts with thin undegenerate walls, containing clear, serous, sanguineous or purulent fluids. A few

compound cysts may also be treated in this way, by tapping successively the several cysts; but each cyst must be injected separately and at different times. The cysts which, though unilocular, contain a thick, thready, albuminous fluid, require drainage in addition to iodine injection, if they are not at once delivered over to the ovariotomist.

The great advantages of this mode of treatment by iodine injections are, that in cases suited for it, even when it is not successful, it is perfectly safe, always improves the condition of the patient, and in no way interferes with the subsequent performance of ovariotomy. Boinet, therefore, thus sums up his injunctions:—'Never treat any other tumours with iodine injections than the simple, moveable, uncomplicated cysts with thin, unchanged walls, and clear, serous, sanguineous or purulent contents, as such cysts, whatever may be their size and the quantity of the fluid in them, close up with the greatest facility, and leave no trace of their existence. A single puncture and one injection of the cyst are often sufficient for its obliteration. Trust only to ovariotomy for the removal of every other kind of cyst, even those which, though unilocular, contain a thick, gelatinous matter, and deal with them as if they were multilocular, since the process of drainage is tedious, and sometimes demands the patience and perseverance of months or even years.'

Boinet recommends, as the most fitting time for the operation of iodine injections, the earliest moment after it is once ascertained that the cyst has formed, fluctuation has become perceptible, and the disposition to enlarge in spite of general treatment has manifested itself; and he selects as the point of puncture, that part of the cyst situated where the tumour first developed. He does this, because the retraction of a cyst so punctured is more likely to be complete; there is less chance of the canula escaping from the puncture, and the evacuation of the contents takes place readily, notwithstanding parietal adhesions at distal parts of the tumour. He lays great stress upon the exact observance of the different steps of his operations, and directs the puncture of the cyst to be made with a large trocar, expressly adapted to this purpose, as near as possible to its ascertained or supposed point of origin, immediately above the crural arch. The trocar is then to be removed from the

canula, and the contents of the cyst allowed to flow out without any effort on the part of the patient, or pressure upon the abdomen. As soon as two-thirds have escaped, a long gum-elastic tube, large enough to fit the canula, is passed through it into the cyst, and the canula being withdrawn, its place in the puncture is completely occupied by the tube. The cyst being emptied, warm water is repeatedly injected so as to cleanse the interior if the contents have proved to be either thick, sanguineous, or purulent; if purely serous and limpid, the iodine solution may be thrown in at once, left for five or ten minutes, and then withdrawn by the syringe. A certain small quantity always remains, but it produces no inconvenience. While the injection is in the cyst it should be gently kneaded with the hand, and the position of the patient should be changed so as to bring the liquid into contact with all parts of the lining membrane. The injection of iodine into an ovarian cyst ought not to occasion any pain.

Great precaution must be taken in withdrawing the tube. The fingers of the left hand embracing the tube and the puncture, should press upon the abdominal wall, so as to keep it in close contact with the cyst. The syringe attached to the tube seals it hermetically, and the operator with his right hand should contrive to exhaust as much of the fluid as possible with the syringe, while the assistant draws out the tube by a rapid movement. The pressure of the left hand is continued, and the patient should be turned on the side opposite to the puncture, which is to be covered with plaster, compresses, and a bandage. Boinet considers that this position ought to be retained for some twenty-four or eight-and-forty hours, so as to prevent any escape of fluid from the cyst into the peritoneal cavity.

All this can be accomplished easily enough, and without danger, if the syringe and gum-elastic tube be used. The elastic tube applies itself tightly to the nozzle of the syringe, all the contents of the cyst, even if thick, can be sucked out, water may be pumped in and out repeatedly, there is no fear of the iodine solution passing into the peritoneal cavity, or elsewhere than into the cyst, the surgeon can squeeze it into contact with every part of the cavity as the puncture in the cyst wall is securely closed by the large tube, it can all be

drawn out again when it has done its work; and by removing the tube and syringe together, there is no chance of air finding its way into the empty cyst. Experience shows that the reverse may happen when the operation is attempted with the syringe and ordinary canula.

Boinet does not regard the quantity of solution thrown into the cyst, whether large or small, as of much importance, provided it is applied to every part of the interior, and left there for some minutes; and he always uses it in the same proportions—about 100 or 120 grammes of tincture of iodine (*du codex*) mixed with an equal quantity of water, with four grammes of iodide of potassium or two or four grammes of tannic acid. In case of failure with the first injection, others of the same strength, or stronger, up to the pure tincture, but always with the addition of the iodide or acid in proportion, should be repeated in the same way as soon as the return of fluctuation is recognised, or tapping may be possible; and he finds the treatment answer equally well in the event of suppuration.

Out of the first one hundred cases of ovarian cysts injected with iodine by Boinet, sixty-two were cured, and thirty-eight remained unsuccessful. Of the thirty-eight cases of failure, sixteen died. Four of these sixteen lost their lives a few days after the operation, three paying the penalty of some stupid imprudence, and the rest were carried off some time afterwards by the usual progress of the disease. The twenty-two survivors had their condition materially amended, and their lives prolonged some five or six years. Of the thirty-eight unsuccessful cases, three-fourths proved to be multilocular cysts, which at the present day would not be treated with iodine, and, in fact, only five of the cases, which were fit for the operation, could be regarded as absolute failures. Latterly, from the exercise of due caution in the selection of cases, the iodine treatment has yielded at least ninety per cent. of cures, and out of the last twenty-nine cases reported, two only did not succeed. Three hundred and thirty-four punctures and three hundred and twenty-seven injections were made in these one hundred cases, and in none were there any immediate ill consequences. Cure followed the first injection thirty-seven times, the second ten times, and only two cases required as many as seventeen injections.

I have not injected iodine into an ovarian cyst with the hope of obtaining a radical cure in more than eight patients. In six of these, neither more nor less good was done than by simple tapping; but there was more pain and some temporary inconvenience from the effects of the iodine absorbed. In two the cyst did not refill for several years; but these were both simple cysts with limpid contents; and in such cysts, I believe, simple tapping is quite as effectual alone as it is with the injection of iodine in addition.

When iodine injection is really useful, and, in my opinion, the only class of cases where its employment should be recommended, is in cases where, after tapping either by the abdominal wall, vagina, or rectum, cyst inflammation has occurred, and the patient is suffering from absorption of the decomposing contents of the cyst. Here drainage becomes necessary to save the patient from pyæmia or septicæmia; but she may suffer considerably in appetite and strength if the fluid which escapes is offensive; and it ought to be deodorised. For this purpose iodine, or carbolic acid, or sulphurous acid, or chromic acid may be used in tolerably strong solution; and iodine is, perhaps, preferable to all the others. A solution of one part of iodine and two of iodide of potassium to twenty parts of water may be used night and morning, injected through the catheter after washing out the cyst with warm water; and the greater part of the iodine solution injected may be allowed to run away again at once; but a little may be left in the cyst, partly to act on its walls and partly to deodorise the fluid contents of the cyst as they decompose.

Professor Krassowski, of St. Petersburg, has published the results of his treatment of forty-three cases of ovarian tumour by either simple tapping, tapping with injection of iodine, or tapping and drainage. Eleven were simple cysts. One case was completely cured by tapping and iodine injection; a second, if cessation of the disease for six months can be so regarded; three found temporary relief; and six died, two of the deaths being from peritonitis.

Out of thirty-two cases of colloid cysts tapped either through the abdominal wall or the vagina, eight of them injected with iodine as by Boinet, four tapped and drained, and twenty simply tapped, twenty-eight died after only a short time, and

the fate of the remainder is unknown, as they left the hospital with signs of refilling.

So that, out of forty-three cases, there were only one complete, and one doubtful cure. The number of deaths was thirty-four, with five from acute peritonitis; and in the seven cases of temporary relief there was return of the disease; but the date of death was not ascertained.

Treatment by incision.—The practice of laying open ovarian cysts by incision no doubt arose when, during tapping, the instrument used proved to be too small for the escape of thick fluid. On withdrawing the canula it would be found filled with glue-like matter, and similar matter would be observed exuding from the opening. The natural result would be that the surgeon would enlarge the opening, until the contents of the cyst could escape or be squeezed out. This has occurred to me more than once. I was present when Mr. Armstrong Todd tapped a young lady. After a little fluid had escaped, the canula became clogged with hair and fat, and it was withdrawn. Fluid continuing to ooze away, the opening was enlarged until first one finger, then two, and then a tablespoon could be used to scoop out many pounds of semi-solid fat, with masses of hair and bony spiculæ, from a cyst which was intimately adhering over a large extent of the abdomen. Ovariotomy was proposed to the parents, but as the unfavourable conditions were explained to them at the same time as the possibility of a cure by the incision was also pointed out, they preferred the latter alternative, and the patient only survived a few days.

In another case, with Mr. Taunton, of the Commercial Road, where the contents of a large cyst consisted of very thick colloid, I made an incision of about two inches long, and squeezed out many pounds of matter as thick as calf's-foot jelly. In this case considerable relief was given for a time, but the patient ultimately died exhausted from the continuous discharge.

In the cases hereafter described, where it has been impossible to complete ovariotomy, and the cyst, or a portion of it, has been left within the abdominal cavity, the edges of the opening in the cyst have been fixed to the abdominal wall by suture, and such cases have become similar to those treated by incision. I

have not adopted the practice under any other circumstances, but it has been repeatedly done by others, and various means have been taken to prevent the escape of the fluid into the abdominal cavity. Adhesion between the cyst and the abdominal wall has been secured by caustic issues, or by the insertion of needles, or by the use of special instruments, or by suture after laying bare the cyst. As soon as adhesion was believed to be complete, the incision was made, and the cyst kept open until the obliteration of its cavity took place. So far as I can learn, from my own experience and the study of recorded cases, this practice is far more dangerous than ovariotomy, very much more uncertain in its results, and very much less likely to be followed by complete cure. I think, therefore, it should only be considered admissible in cases where ovariotomy cannot be completed. In such cases, after incision and emptying the cyst as far as possible, the opening should be kept patent, and the case treated as an abscess by draining and the injection of disinfecting or deodorising agents. The case then becomes one of drainage.

CHAPTER X.

THE RISE AND PROGRESS OF OVARIOTOMY.

Ovariotomy. From *ὠάριον*, ovary; and *τομή*, incision. [Syn. *Ovariotomie*, Fr. and Ger.—*Ovariotomia*, Ital. and Sp.] Definition: The operation for the removal of one or both ovaries. As it is only performed by surgeons when one or both ovaries are diseased, it is a very different proceeding from the extirpation of healthy ovaries, which has been practised from remote antiquity to the present time on domestic animals for economical purposes, and both in ancient periods and in the middle ages on women, almost exclusively for immoral purposes. Galen, in his work 'De Semine,' records that in Eastern Asia and in Cappadocia, sows were spayed in order to fatten them, and to improve the flavour of their meat. He also points out the greater difficulty and danger of this operation than the castration of male animals:—'Non tum ita tutum in fœminis testium extractio administrari potest ob sedem in quâ collocati sunt; . . . majusque in hoc quam in maribus periculum est.'

We find a passage in Pliny's 'Historia Animalium' (lib. viii. c. 77):—'Castrantur suis fœminæ quoque, sicuti cameli, post bidui inediam suspensæ pernis prioribus, vulva recisa; celerius ita pinguescunt,' which appears dubious, whether castration or infibulation is alluded to.

In Book ix. of *Περὶ Ζώων Ἱστορίας* of Aristotle, the castration of cows and camels is mentioned.

Athenæus, in *Δειπνοσοφιστῶν* (lib. xii. c. 9), relates a story of Andramystes, a Lydian king, who kept castrated females instead of eunuchs in the service of his harem; and Gyges, another Lydian king, is reported to have had several of his concubines castrated, in order to prolong the charms of their youth.

Omitting some apocryphal records of later periods, we pass

on to several writers of the seventeenth and eighteenth centuries, as Vierus, Riolan ('Opera prima,' Paris, 1610; 'Anatome,' p. 142), Diemerbroeck ('Anatomia corporis humani,' Lyon, 1679; I. I. c. xxiii.), Boerhave ('Prælect. Academ. in prop. inst.' f. 5, pars 2 and 669), Graaf ('De Mulierum Organ. Generat. inserv. Tract. nov.' cap. 13), Plater ('Observ. libri tres,' Basle, 1680, p. 248), &c., who either mention the extirpation of the ovaries as having been performed, or propose this operation in the treatment of nymphomania.

So far, by all these writers, the removal of sound ovaries from strong and healthy individuals, placed under the most favourable circumstances, was proposed or commented on. In the present day a diseased organ is extirpated from a person more or less weakened and distressed by long suffering. The ancient operation was the pander to luxurious vice and immorality. Modern ovariotomy, when successful, rescues the victim from otherwise hopeless suffering and certain death, and, even when unsuccessful, mercifully shortens her martyrdom.

It was not earlier than in the seventeenth and eighteenth centuries that ovariotomy was proposed and suggested as a radical cure for diseased ovaries; and, as late as the beginning of the eighteenth century, that this operation was first performed, although it remained long in discredit; and it is only within the last fifteen years that it has been at all frequently or generally practised.

Theodor Schorkoff, in his 'Dissertatio medica inauguralis de Hydrope Ovarii' (Sept. 7, 1685), expresses the belief that the extirpation of dropsical ovaries would lead to a permanent cure, if the operation itself were less cruel and hazardous.

Schlenker, in the 21st thesis of his dissertation 'De singulari ovarii sinistri morbo' (1722), proposes the question whether a radical cure of diseased ovaries might not be effected by the removal of the organ through an incision in the abdomen; but he leaves the answer to his more experienced colleagues.

Soon after him, Willius, of Basle, published (in 1731) a pamphlet, 'Specimen medicum sistens stupendum abdominis tumorem,' which contains the following passage:—'When, however, the dropsy fills all the chambers of the ovary, when the fluid is thick and viscid, and no hope of recovery is enter-

tained, we question whether such an ovary ought not to be extirpated, and so the root and cause of the disease be removed. We know from experience that severe and large abdominal wounds have healed; they are not likely to prove more dangerous in the case of attempting a cure by excision of the ovaries.' Notwithstanding this advanced view, he still shrank from the execution of the operation, afraid of the extent of the incision required to remove large tumours; of the adhesions likely to be met with; the pain inflicted; the hæmorrhage, the exposure of the abdominal viscera, and its fatal consequences. Giovanni Targioni Tozetti recommends the extirpation of the ovaries as a last resource, when all other curative means have failed. ('Prima raccolta di osservazioni mediche,' Firenze, 1752, p. 78.)

Ulric Peyer ('Acta Helvetica,' t. t. Basil, 1751, app. 1), Theden ('Nova acta, nat. curios.,' tom. v. p. 289), and Delaporte ('Mémoires de l'Académie royale de Chirurgie,' 1833, p. 757) recommend the extirpation of ovarian tumours; and Morvand, the Secretary to the Academy, prophesies the ultimate triumph of this operation with the words: 'Modern surgery is capable of great achievements; unlimited roads ought to be opened to her goal—to cure.'

Antony de Haen ('Ration. Medend.,' part iv. cap. 5, § 2) and Morgagni were opposed to the operation, which W. Hunter and Van Swieten ('Commentaries in H. Boerhave's Aphor.,' 1770, tom. iv. § 1223) justify in extreme cases.

Dr. William Hunter, in a paper 'On Cellular Tissue,' published in 1762, in the second volume of the 'Medical Observations and Inquiries,' after stating that the trocar is almost the only palliation in the treatment of ovarian dropsy, says: 'It has been proposed by modern surgeons, deservedly of the first reputation, to attempt a radical cure by incision and suppuration, or by excision of the cyst.' In support of his opinion, 'that excision can hardly be attempted,' having pointed out difficulties during the operation, and dangers following it, which modern practice has overcome, he concludes with the following words, which foreshadow some of the modifications in the operation, by which ovariotomy, once stigmatised as cruel, barbarous, scarcely less than murder, has become one of the most brilliant triumphs of modern surgery. Hunter says: 'If

it be proposed, indeed, to make such a wound in the belly, as will *admit two fingers or so*, and then *tap the bag and draw it out*, so as to bring its root or peduncle *close to the wound of the belly*, that the surgeon may cut it without introducing his hand, *surely in a case otherwise so desperate it might be advisable to do it*, could we beforehand know that the circumstances would admit such treatment.' (Op. cit. p. 45.)

In a lecture delivered in 1785, John Hunter says: 'I cannot see any reason why, when the disease can be ascertained in an early stage, we should not make an opening into the abdomen and extract the cyst itself. Why should not a woman suffer spaying, without danger, as well as other animals do? The merely making an opening into the abdomen is not highly dangerous. In a sound constitution, perhaps, a wound merely into the abdomen would never be followed by death in consequence of it.'

Not many years later, ovariotomy found an enthusiastic advocate in Chambon ('Maladies des femmes. Maladies chroniques à la cessation des règles,' chap. xxxix. 'De l'extirpation des ovaires,' Paris, 1798). Adhesions, he says, do not generally render ovariotomy impossible. They are mostly found between the tumour and the peritoneum, the broad ligament, the Fallopian tubes and their fringes, and sometimes the omentum and the intestines. It is not always possible to determine the extent, and the nature of the existing adhesions beforehand, when the tumour is moveable. When the tumour is free, difficulties in the operation and serious accidents will seldom be met with, provided the patient is not suffering from any discrasia or is not much exhausted, and then the operation ought not to be performed. Adhesions with the omentum seldom interfere with the mobility of the tumour, in which case their diagnosis is difficult. The adherent border of the omentum may be removed without danger. Abnormal connections between the tumour and intestines will not contra-indicate the operation, unless there is a high degree of inflammation, by which the adhesion has been contracted. In such a case, the tumour will be found firmly connected with the intestines, and it will be better to abstain from the operation. Such adhesions are not only very extensive, but also very intricate, the tumour and the neighbouring intestine forming almost one mass. If it be

impossible to remove the diseased parts, either a portion of the tumour must be left behind, and a protracted and dangerous suppuration would be the consequence ; or a portion of the adherent viscus must be removed, which would place the life of the patient in jeopardy. He thought that all the different varieties of ovarian degeneration might be extirpated, provided none of the above contra-indications were present. The same rules apply also to the dropsy of the tubes. There are ovarian tumours which, after having attained a certain size, will remain stationary. This will be observed sometimes in scirrhus. Such cases should not be interfered with. He concludes with the words, 'I am convinced that a time will come when this operation will be considered practicable in more cases than I have enumerated, and that the objections against its performance will cease.'

John Bell never performed ovariotomy, but Dr. Ephraim McDowell, a Virginian, practising in Kentucky, had attended Bell's course of lectures in Edinburgh, in 1794. It is said of him by his biographer, Dr. Gross, that he was 'enraptured by the eloquence of his teacher ; and the lessons which he imbibed were not lost upon him after his return to his native country. Bell is said to have dwelt with peculiar force and pathos upon the hopeless character of ovarian tumours when left alone, and of the practicability of removing them by operation. It is not improbable that the young Kentuckian, while listening to the teaching of the ardent and enthusiastic Scotchman, determined in his own mind to extirpate the ovaries of the first case that should present itself to him after his return to his native country. The subject had evidently made a strong impression upon him, and had frequently engaged his attention and reflection. He had thoroughly studied the relations of the pelvic viscera in their healthy and diseased conditions, and felt fully persuaded of the practicability of removing enlarged ovaries by a large incision through the walls of the abdomen.'

McDowell returned to Kentucky in 1795, and commenced practice at once ; but it was not until fourteen years afterwards that he was consulted (in 1809) by a patient upon whom he first performed ovariotomy, and who survived in good health until 1814, and died after the completion of her seventy-eighth year.

No one can dispute the validity of the direct claim of McDowell as designedly the first rational ovariotomist. At the same time it must be maintained, that the still greater merit of pointing out the absence of any physiological reasons against the operation, the possibility of its safe performance in the human female, and the class of cases in which it ought to be admissible, is due to a series of eminent British surgeons. But in this country, such is the sacredness of human life, even when threatened by fatal disease; so strong is the consciousness that the introduction of innovations like ovariotomy insures the destruction or shortening of a certain number of lives during the tentative stage of the practice, that men even of the stamp of the Hunters and the Bells naturally shrank from the responsibility, imposed upon them by their position and reputation, of adopting and inaugurating it as a part of legitimate surgery; and elected rather, in the modesty of their greatness—'stare decisis et non quietâ movere'—to content themselves by tending with careful pains the last flickerings of life in their confiding patients, and soothing, as best they might, their prolonged sufferings, than, as it would seem to them, proceed to the choice and immolation of the sacrificial victims demanded as the inevitable price of the safety of future generations, or the aggrandisement of their own fame. And it must be remembered that, at that time of day, the mortality from all operations was much greater than it is now; that the sick and diseased were more passively quiescent under their maladies and less tolerant of any surgical suggestions, just as we ourselves find to be the case among the unroused population of an outlying agricultural district; that they were not buoyed up, as modern women are, by the histories and promises of painless extirpations under chloroform or methylene; and that, without anything like mawkish sentimentalism, surgeons themselves had to encounter the 'peine forte et dure' of their suppressed sympathy, and nerve themselves up to the infliction of the most deliberate and tedious eviscerative vivisection. The disease was looked upon as a mystery, and its ending in death as a matter of course; and, instead of being accompanied, as we now see it, by fretful resistance and chafings to escape, it only led — 'Deo duce, medico comitante' — to stolid endurance or religious sub-

mission; and, on the part of the profession, to an 'ad normam' attendance, rather ceremonial than remedial.

But McDowell was a free man, in a new country, clear from the conventional trammels of old-world practice, found his patients in the most favourable conditions of animal life, seems to have had one of those incomprehensible runs of luck upon which a man's fate and reputation so often turn if he has the sagacity and energy to put such fortunate accidents to good account, and was happy, as those usually are who can afford or constrain themselves to wait, in finding suitable time, place, persons, and opportunity for testing the exercise of his young American 'felix temeritas,' based upon and guided by the Scotch 'perfervidum ingenium' of his tutor Bell. He lost only the last of his first five cases of ovariotomy, and thus, as it were, established at the outset the natural standard of mortality which may be expected for so serious an operation.

The details of his first operation, as recorded by Dr. Gross, are interesting enough to the practitioner for repetition, and are the best testimony to his sagacity, firmness, and caution:—

'It was performed on Mrs. Crawford, of Kentucky, in December, 1809. The tumour inclined more to one side than the other, and was so large as to induce her professional attendant to believe that she was in the last stage of pregnancy. She was affected with pains, similar to those of labour, from which she could find no relief. The wound was made on the left side of the median line, some distance from the outer edge of the straight muscle, and was nine inches in length. As soon as the incision was completed, the intestines rushed out upon the table; and so completely was the abdomen filled by the tumour that they could not be replaced during the operation, which was finished in twenty-five minutes. In consequence of its great bulk, Dr. McDowell was obliged to puncture it before it could be removed. He then threw a ligature round the Fallopian tube, near the uterus, and cut through the attachments of the morbid growth. The sac weighed seven pounds and a half, and contained fifteen pounds of a turbid, gelatinous-looking substance. The edges of the wound being brought together by the interrupted suture and adhesive strips, the woman was placed in bed and put upon

the antiphlogistic regimen. "In five days," says Dr. McDowell, "I visited her, and, much to my astonishment, found her engaged in making up her bed. I gave her particular caution for the future; and in twenty-five days she returned home in good health, which she continues to enjoy."

'It will not be uninteresting here to state that Mrs. Crawford, at the time of the operation performed upon her by Dr. McDowell, lived in Green County, Kentucky, from whence she removed, some time afterwards, to a settlement on the Wabash River, in Indiana, where she died, March 30, 1841, in the 79th year of her age. There was no return of her disease, and she generally enjoyed excellent health up to the period of her death. She had no issue after the operation. The youngest child, Mr. Thomas H. Crawford, who has kindly communicated to me these facts, was born in 1803, nearly six years before the operation.'

Dr. McDowell was a kind-hearted, amiable man, an accom-

Aet. 56.

plished scholar, though no writer, indifferent to notoriety, but with an extensive reputation. As a surgeon, he was exceed-

ingly cautious, calm, and firm; paying great attention to the details of his operations and treatment, and selecting and drilling his assistants with much care.

In person he was nearly six feet in height, with a florid complexion, and very black eyes. He was of a remarkably happy disposition, and rather inclined to corpulency. Up to the time of his last sickness, he was one of the most active men in Kentucky. Dr. McDowell remained faithful to his profession until the last moments of his life. He died, literally, in harness. The portrait on the preceding page is copied from a photograph, taken from an oil painting now in possession of the family, and sent to me by Dr. Jackson, of Danville, Kentucky, who informed me that the painting was by Jewett, taken when the sitter was in his fifty-sixth year, and was deemed by his family an excellent likeness.

In 1808, one year before Dr. McDowell's first operation, D'Escher ('Considérations médico-chirurgicales sur l'hydropisie enkystée des ovaires.' Thèse : Montpellier, 1808), suggested the removal of diseased ovaries through an incision along the external border of the rectus muscle. Existing adhesions should be detached with the fingers, or, if necessary, with a bistoury; the tumour extracted and excised after the application of a ligature around the pedicle. The ends of the ligature were to be brought out by the wound, the edges of which were kept in close apposition by lateral pads and a bandage around the body.

McDowell's case has long been considered the first case of ovariotomy on record; for the operation of L'Aumonier of Rouen, in 1776—which had been referred to as one of ovariotomy, and which even Dr. Atlee, in his table (published in 1851), enumerates as the first operation of ovariotomy—was in a case of pelvic abscess, which he opened by an incision through the wall of the abdomen above Poupart's ligament, six or seven weeks after parturition. He seems also to have separated the fimbriæ of the Fallopian tube from the sac of the abscess, and to have removed the ovary without any necessity, and without any idea of ovariotomy. His case may be found recorded in the 'Histoire de la Société royale de la Médecine,' 1782, tom. v. p. 298.

Another case, included in some of the tables of ovariotomy by Professor Dzondi, is one in which a pelvic tumour was cured

by drawing out a cyst through an incision in the abdominal wall of a *boy* twelve years old.

Atlee, however, communicates (in the 'American Journal of Medical Sciences,' vol. xvii. 1849, p. 534) a case which claims the priority to that of McDowell by more than a century. It is the case of Dr. Robert Houstoun, which may be found under the head, 'A dropsy of the left ovary of a woman, aged fifty-three years, cured by a large incision made in the side of the abdomen,' in the 'Philosophical Transactions' (from the year 1719 to 1733), abridged and disposed under general heads, vol. vii. p. 541 (London, 1734). From this case it will appear that ovariotomy originated with British surgery, on British ground. Dr. Robert Houstoun operated, in August 1701, on a Mrs. Margaret Miller, near Glasgow, who since her last confinement, thirteen years before, when twenty-three years of age, suffered from ovarian dropsy. The tumour had grown to a monstrous bulk; she was much wasted, had great difficulty in breathing, want of appetite and sleep, and bed-sores from long confinement. This case is in many respects a very curious one, and the operator's own words are worthy of record. He says: 'After having obtained the patient's consent that, in order effectually to relieve her, I must lay open a great part of her belly, and remove the cause of all that swelling . . . . I prepared without loss of time what the place would allow, and with an imposthume lancet laid open about an inch; but finding nothing issue, I enlarged it two inches; but even then nothing came forward but a little thin yellowish serum, so I ventured to lay open two inches more. I was not a little startled, after so large an aperture, to find it stopped only by a glutinous substance. All my difficulty was to remove it. I tried my probe—I endeavoured with my fingers, but all was in vain; it was so slippery that it eluded every touch and the strongest hold that I could take. I wanted in this place almost everything necessary, but bethought myself of a very odd instrument, but as good as the best, because it answered the end proposed. I took a strong fir-splinter, wrapped some loose lint about the end of it, and thrust it into the wound; and by turning and winding it, I drew out about two yards in length of a substance thicker than any jelly, or rather like glue that is fresh-made and hung out to dry; the breadth of it was above

ten inches. This was followed by nine full quarts of such matter as I have met with in steatomatous and atheromatous tumours, with several hydatids of various sizes, containing a yellow serum, the least of them bigger than an orange, with several large pieces of membrane, which seemed to be parts of the distended ovary. Then I squeezed out all I could, and stitched up the wound in three places, almost equidistant. The lower part of the wound was kept open by a small tent. Some serosity discharged from it for four or five days. The wound was covered in its whole length with a pledget spread with some home-made balsam, over that several compresses dipped in warm brandy, then several towels; all these dressings were fastened by swathing her round the body. An anodyne was given several times a day. The next morning the patient was found much refreshed by a good night's rest, the first she enjoyed for three months past. After three weeks she was able to sit outdoors, wrapped up in blankets, superintending her farm-labourers. She recovered, and lived in perfect health from that time till October 1717, when she died after ten days' illness.'

Although this isolated case of Dr. Houstoun undoubtedly strengthens the claim of British surgery to the honour of originally practising ovariotomy, it will hardly deprive Dr. McDowell of his undeniable merit of having been the first who, guided by scientific principles, enriched modern surgery with the operation. He followed up his first case by others. He performed the operation thirteen times altogether between 1809 and his death in 1830. The precise number of deaths cannot be ascertained, but of eight cures there can be no doubt. McDowell's successes were followed up by other American surgeons. In 1822, Mr. Smith, of Connecticut, performed a successful operation. He removed a cyst containing six pints of fluid, through an incision five inches long. He broke down extensive adhesions between the tumour and the abdominal wall and the omentum. The wound was united by means of adhesive plaster and roller. No unfavourable symptom occurred until the separation of the ligature, when an abscess formed, which had to be opened. The patient, twenty-three years of age, was able to walk after three weeks, and speedily recovered. (Case of ovarian dropsy successfully removed by a surgical

operation, 'Edinburgh Medical and Surgical Journal,' 1822; and 'American Medical Recorder,' Philadelphia, vol. v. 1822, No. 7.)

In another case Smith was unable to complete the operation on account of extensive adhesions. He emptied the cyst, and the patient recovered. But the cyst filled again. ('Med. and Surg. Memoirs,' p. 231.)

In 1823, G. Smith removed an ovarian tumour from a negro woman, through an incision extending from the umbilicus to the os pubis, after having previously emptied the contents of the cyst. The peduncle was secured by a ligature. The patient recovered within twenty-five days. ('North American Med. and Surg. Journal,' January, 1826.)

Lizars, of Edinburgh, was the first to attempt ovariotomy in this country. He performed two operations in 1825, of which the first was successful, the second fatal in fifty-six hours. He opened the abdomen on two other occasions, but only to prove errors of diagnosis. Both patients recovered.

The first attempt to perform ovariotomy in London was made in 1827, by Dr. Granville, who operated in two cases. In one the operation was abandoned on account of the extent of the adhesions; the woman recovered. In the other case a fibrous tumour of the uterus, weighing eight pounds, was removed; but the patient died on the third day.

The ill-success of Mr. Lizars and Dr. Granville, who both operated by the long incision, brought discredit upon the operation; and it was not until 1836, nine years after Dr. Granville's failures, that a provincial surgeon, Dr. Jeaffreson, of Framlingham, acted upon the suggestion of William Hunter, and performed ovariotomy by the small incision for the first time in Great Britain. A bilocular cyst was removed through an opening only an inch and a half long. The patient was alive in 1859, was fifty-six years of age, and had given birth to one boy and three girls after the operation.

In the same year (1836), another provincial surgeon, Mr. King, of Saxmundham, successfully removed an ovarian cyst through an incision only three inches long; and Mr. West, of Tonbridge, also had a successful case, the incision being only two inches long. In 1838, Mr. Crisp, of Harleston, in Suffolk, removed a multilocular cyst through an incision only one inch

long. The patient lived fifteen years after the operation, and enjoyed good health.

In 1839, Mr. West, of Tonbridge, had a second successful case; a single cyst, which contained twenty-two pints of fluid, having been removed by the short incision. Mr. West also had an unsuccessful case of completed ovariotomy, and one in which the adhesions prevented the completion of the operation. In the same year the first attempt to perform ovariotomy in a London hospital, of which I have been able to find any record, was made at Guy's, by Mr. Morgan; a small incision was made, adhesions were found, the tumour was not removed, and the patient died in twenty-four hours.

In 1840, Mr. Benjamin Phillips operated at the Marylebone Infirmary, and completed the operation for the first time in London; but the result was unsuccessful.

In 1842, Dr. Clay, of Manchester, commenced his series of operations, performing ovariotomy four times, and in three out of the four with success. In 1843, he also operated four times, twice successfully. In 1843, Mr. Aston Key removed both ovaries from a patient in Guy's Hospital. His incision extended from the ensiform cartilage to the pubes, and death followed on the fourth day. Later in the same year, Mr. Bransby Cooper operated in the same hospital by the long incision, and removed a large multilocular cyst, but the patient died on the seventh day.

So that thirty years ago, although ovariotomy had been performed with very qualified success in one case in Scotland, and in at least ten cases with complete success by surgeons in our own provinces, it had never been performed successfully in London. It was the good fortune of Mr. Walne to perform the first successful operation in London, in November, 1842; and he had two other successful cases in May and September, 1843. In that year, and in 1844, Dr. Frederic Bird had three, and Mr. Lane two successful cases. Mr. Lane's first patient was still alive in 1867, and had seven children. In 1843 and 1845, Mr. Southam, of Salford, and in 1845, Mr. Dickson, of Shrewsbury, published successful cases. In 1846, Mr. H. E. Burd had a case which is published in the 30th and 32nd volumes of the 'Medico-Chirurgical Transactions,' the patient having recovered and had a child two years after the operation.

In the same year Mr. Solly assisted materially in the progress of ovariotomy by pointing out one of the causes of danger and the means of avoiding it; taking advantage of an unsuccessful case which occurred in his practice in St. Thomas's Hospital, to teach his pupils and professional brethren, that retraction of the pedicle behind the ligature is very likely to occur, and to lead to fatal hæmorrhage, unless prevented by great care. His clinical lecture, published in the 'Medical Gazette,' in 1846, contains a masterly review of the arguments for and against the operation, which must have had considerable effect upon the mind of the profession at the time.

The year 1846 is also noteworthy in the history of ovariotomy, as in that year Mr. Cæsar Hawkins performed the operation successfully in St. George's Hospital, this being the first successful operation in any of our metropolitan hospitals. But Mr. Hawkins did not repeat the operation, and his example was not followed by others for several years; Dr. F. Bird and Mr. Lane being the only operators in London, except Dr. Protheroe Smith, who had a successful case, although Dr. Clay continued his operations at Manchester, and successful cases were recorded by Dr. Elkington, of Birmingham, and by Mr. Crouch in 1849, and by Mr. Cornish, of Taunton, and Mr. Day, of Walsall, in 1850.

In 1850, Mr. Duffin inaugurated a new era in ovariotomy, by pointing out the danger of leaving the tied end of the pedicle to decompose within the peritoneal cavity, and by insisting upon the importance of keeping the strangulated stump outside. He acted up to this principle in a case which was published in the thirty-fourth volume of the 'Medico-Chirurgical Transactions.'

My own experience of ovariotomy dates from December, 1857. I then made the attempt, which will be noticed in the latter part of this volume, as the first of a series of cases of incomplete ovariotomy. In February, 1858, I repeated the attempt, and this case now stands as the first of five hundred cases of completed ovariotomy which I have performed between 1858 and 1872. When I began to test ovariotomy by personal experience, I publicly pledged myself to make the results fully known to the profession, and to publish every case, whether it was successful or not; and I have scrupulously fulfilled this

promise. My first five cases were made the subject of a paper, which was read before the Royal Medical and Chirurgical Society in February, 1859. Case after case was published in the medical journals, or the tumours were exhibited at the Pathological Society. Many of the most distinguished surgeons of the age, not only of our own country, but from France, Belgium, Germany, Italy, and Spain, and from America, assisted at one or more of my operations, and were thus induced to perform the operation themselves. In December, 1864, I published a volume, containing details of every case, both hospital and private, in which I had either completed or commenced the operation. The cases of completed ovariotomy amounted to one hundred and fourteen. In one case, ovariotomy was performed twice on the same patient; in ten cases, the operation was commenced but not completed. The results of the one hundred and fourteen cases of completed ovariotomy were, seventy-six recoveries and thirty-eight deaths. The following extract from the Introduction to that volume may, even now, be of some interest in the history of the progress of ovariotomy:—

'As the year 1864 closes upon us, and we receive from Australia and Ceylon reports of the first successful cases of ovariotomy in our colonies; when we hear of a case in Russia, another in Switzerland, a third in Bavaria; when Nélaton's example in France has been followed with remarkable success by Kœberlé; when Atlee and Peaslee are, with other Americans, maintaining in this branch the position of Western surgery; when the cases of Keith in Edinburgh, and Grimsdale in Liverpool, give promise of long careers of brilliant success; and when successful operations have been performed in many of our provincial hospitals, by many private practitioners both in London and in the provinces, and in at least five of our metropolitan general hospitals, it is difficult, as the new year opens, to remember, without some doubt as to the correctness of memory, what was the position of ovariotomy in the opinion of the profession only seven years ago, when 1857 was at its close, and 1858 at its dawn.

'Yet, it cannot be forgotten that the discussion at the Royal Medical and Chirurgical Society in 1850, after the paper of Dr. Robert Lee, was closed by Mr. Lawrence with the question, Whether attempts to treat diseased ovaries by surgical

operation, "can be encouraged and continued without danger to the character of the profession."

'Assertions were made and repeated, and were never satisfactorily answered, that the profession had no information as to the fatal cases, or the cases in which the operation could not be completed, or in which errors of diagnosis had been committed by operators who had made known their successes, but not their failures. Dr. Clay had steadily continued in the career which he began in 1842, but his operations not being performed in a hospital before numerous professional witnesses, and no connected series of his cases being published, his example had but little influence. Dr. Frederick Bird, who was known to have operated thirteen times, had either ceased to operate or to report his cases; and Mr. Baker Brown (who, between his first case in 1852 and 1856, had lost seven out of nine cases) had not operated for more than two years. One solitary operation by Mr. Cæsar Hawkins was the only successful case of ovariotomy which had ever occurred in any of our large metropolitan hospitals. The operation had been performed once in Ireland successfully; but no successful case had occurred in Scotland since Mr. Lizars' partial success in 1825. In some of the more recent of our standard works on surgery, ovariotomy was not even alluded to. In the best works on diseases of women it was severely condemned; and one most influential reviewer had told us that the operation was one which, "though it may excite the astonishment of the vulgar, calls neither for the knowledge of the anatomist, nor the skill of the surgeon;" and that whenever an operation was performed "so fearful in its nature, often so immediately fatal in its results, a fundamental principle of medical morality was outraged."'

The volume introduced by the above quotation consisted entirely of cases and practical remarks upon them, incorporated with the narrative of each. The reasons or excuse in favour of this plan were stated in these words, and it must be remembered that I was writing in 1864:—'Ovariotomy is comparatively a new operation. Unlike lithotomy, herniotomy, or amputation, it wants the guidance, and it is free from the trammels, of tradition or long history. It is hardly fifty years since it was first performed; not forty years since Lizars first attempted it in Great Britain; not twenty-five years since its first perform-

ance in a London hospital; there are still many hospitals in this kingdom in which it has never even yet been performed; and there are some few men of eminence and authority in this country, and very many more abroad, who still regard it as an operation which is never justifiable under any circumstances.'

The translation in 1860 of Kiwisch's Chapters on Diseases of the Ovaries by Clay, of Birmingham, with the very valuable tables appended to the work, must be regarded as greatly assisting in the progress of ovariotomy in this country. Mr. Baker Brown's success with the cautery, Dr. Tyler Smith's revival of the practice of returning the pedicle with the ligature around it, and the numerous published cases of Hutchinson, Bryant, Murray, and other surgeons, have all had their share in the general result. But above all, Keith, of Edinburgh, has by his great success established the operation in Scotland. In the following letter he gives me the result of his whole experience up to the end of June, 1872:—

'I send you a very brief note of the results of my cases up to this date. It includes every case in which I have opened the abdomen for the purpose of removing an ovarian tumour. I have never attempted the removal of any fibrous tumour.

'Of one hundred and forty-four operations since 1862, there have been one hundred and seventeen recoveries and twenty-seven deaths. The fatal cases include two in which portions of the cyst were left behind.

'In three cases, on opening the abdomen, the cyst was so adherent that I closed the wound. No harm resulted in either of these cases, and the patients recovered as after an ordinary tapping.

'In one case an opening was made to clear up doubts as to whether a tumour existed or not. It was found to be a case of diseased peritoneum covered with hard transparent bodies—a sort of chronic peritonitis. No harm resulted, and I believe the fluid did not re-accumulate. (Like one of the cases in your book.)

'In one case the disease returned in the other ovary—a mass of soft cancer, surrounded by five or six gallons of ascitic fluid. She had been tapped nine times. I went a long way to see her, and I think unwisely removed the ovary. She was in the last stage of exhaustion, yet lived for four days.

'In another a tumour formed three years after a very severe first operation, and during pregnancy. An incision was made to ascertain its nature, and it seemed to be a mass of cysts growing from the abdominal wall. I did not try to remove it. The patient died suddenly twelve days after, apparently from rupture of one of the cysts.

'These include every case—81 per cent. of recoveries of the first hundred, and eight deaths out of forty-four subsequent cases, the proportion being about the same.

'In four cases I have used the long ligatures of Dr. Clay in the treatment of the pedicle; of the four two died.

'In two cases I dropped the pedicle into the abdomen; both got well from the operation, but one had pelvic abscesses after going home, and died two years after.

'In one case I used catgut ligatures. Both ovaries were removed. The patient recovered after free suppuration in the pelvis.

'In another (both ovaries) I used catgut ligatures after the cautery had failed. The patient died.

'In eight cases the actual cautery was used alone. All recovered.

'The rest were all clamp cases. I like the cautery, and intend to use it more. Hitherto I have used it only in cases of short broad pedicles.

'The health of the patients after operation has, as a rule, been excellent. The following nine cases have died since being operated on:—

'My first case, of typhus fever six years after operation.

'One of heart disease, suddenly, three years after.

'One (where the tumour weighed one hundred and twenty pounds) had excellent health for eight years, and then died of cancer of abdomen.

'Another died of cancer two and a half years after. It commenced in the cicatrix after the birth of a very healthy child.

'Two others died within a year of cancer of peritoneum. In both the operations were severe, but they went home looking the pictures of health.

'One of pelvic abscess two years after. In the other two the cause of death was not ascertained. (One must have been a case of cancer, I think.)

'The rest (one hundred and eight) are, I believe, all quite well at this date.

'I have not given you the numbers of those tapped before operation, because I do not think the result of ovariotomy is much, if at all, affected by tapping. Neither do adhesions of themselves, unless they bleed very much, greatly affect the result.

'I think, however, that the *social position of the patient* has a good deal to do with the result. My deaths have almost all been among poor women—ill-educated, probably ill-fed and overworked, while my well-educated patients, and those in a better social position, have almost all got well. This is not accidental, for you know that my poor cases have been nursed and tended in a way that hospital cases cannot be, and received the same accommodation and the same care that my better class cases have, yet the mortality shows a great difference.'

The present volume carries on my own experience from one hundred and fourteen cases recorded up to the end of 1864, until the completion of five hundred cases up to the end of June, 1872, a number sufficiently large to form a basis for some statistical calculations, and for the deduction of some trustworthy practical conclusions.

Continuing our survey of the history and progress of ovariotomy since its revival in Great Britain, it is interesting to follow its progress in France, Belgium, Germany, Russia, Italy, and Spain, and in America and our colonies, although any such review must necessarily be brief and imperfect.

In France, ovariotomy made but tardy progress, notwithstanding Cazeaux's spirited and energetic advocacy at a meeting of the Académie de Médecine, in 1856, the papers of Charles Bernard in the 'Archives générales de Médecine,' of the same year, and a very able paper by Dr. Worms, in the 'Gazette hebdomadaire,' 1860. Dr. Worms's paper was founded principally upon a careful examination of some of my own early cases. He took the precaution of writing to the medical attendants of the patients, in order to ascertain their condition from the time of operation up to the date of his paper, and this able and spirited advocacy attracted very general attention in France. Perhaps its most important effect was, to induce M. Nélaton to visit England for the purpose of witnessing the operation, and carefully studying its details. He was

here in 1862, and witnessed several operations. He assisted me at one very complicated case, which terminated successfully, and was much interested in another where tetanus proved fatal. On his return to Paris, he operated himself, and published a classical clinical lecture, from which may be dated the revival of ovariotomy in France. Kœberlé, of Strasburg, performed his first operation in 1862, which was also the date of Nélaton's first operation. It had certainly been performed in France before Nélaton's visit to England. The first case was in 1844, by a country surgeon, Dr. Woyerkowski, of Quingez. This case may be looked upon rather as an accidental than an intentional ovariotomy. The next case was in 1847. The patient had undergone fifty-two tappings, when another country surgeon, M. Vaullegeard, of Condé-sur-Noireau, with remarkable ability and courage, successfully removed a tumour which weighed about seventeen pounds. The patient recovered perfect health, although she died five years after, of 'miliary fever.' After this, until Nélaton's visit to England, the history of ovariotomy in France consists of eight unsuccessful operations by Bach, Maisonneuve, Hergott et Michel, Jobert, Boinet, Richard, Démarquay, and Sedillot. Since 1862, the example of Nélaton in Paris, and the influence of Boinet, followed by the many successful operations of Péan, have done much to legitimise the operation of ovariotomy in the capital of France; but the far larger experience of Kœberlé, of Strasburg, has probably had even a still greater effect. Yet at the present day, the operation is a very much rarer one in France than in this country.

I believe I was the first to perform ovariotomy in Belgium, in July, 1865, in the large hospital at Brussels, upon a patient of Dr. Deroubaix, in the presence of a large number of distinguished Belgian surgeons. The operation was completed so easily that it was hoped the example would soon be followed in Belgium; but, unfortunately, the patient died a week after operation, as it was believed, from influences almost inseparable from a large general hospital. Still, as the result was unsuccessful, it probably retarded for a time the progress of ovariotomy in Belgium. The first successful case in that country was by a pupil of my own, Dr. Boddaert, of Ghent, who has published accounts of the case, very kindly attributing his success

to the minuteness with which he followed every detail of the operation as he had seen it performed by me in England. I had a successful case in Ghent in 1871, and Dr. Boddaert has had two successful cases this year. These four cases, I am informed, are the only instances of success out of about twenty operations in that country. Still it is hoped that they will be sufficient to encourage other Belgian surgeons to continue their efforts to save life. Dr. Deroubaix has been in England this summer, with the express object of perfecting his knowledge of the various steps of the operation, and there can be little doubt of his reaping the reward of his intelligence and zeal.

In Germany, until quite recently, ovariotomy was scarcely either talked or thought of. In 1819 and 1820, operations by Chrysmar, and in 1820, by Dzondi, only served to bring the operation into discredit. Dieffenbach, who had long condemned the operation, operated in 1826. He met with great difficulty in arresting the bleeding, but his operation was crowned with success. Martini, Ritter, and others followed Dieffenbach's example, but with so little success that, from 1826 to 1850, only three recoveries were obtained in twenty operations; and, of eighteen completed operations, five proved fatal. Accomplished surgeons—Langenbeck, Heyfelder, Kiwisch, Schulz, Siebold, and Scanzoni—tried what they could do, but failed; and it is not surprising that, for several years, the operation ceased to be practised. In 1866, my volume on 'Diseases of the Ovaries' was translated into German by Küchenmeister. Billroth, who had assisted me, and who had carefully studied the whole subject, began to use his great influence with his countrymen to promote the general acceptance of the operation. Nussbaum, of Munich, came twice to England, assisted me several times, and has performed ovariotomy more frequently than any other German surgeon. Spiegelberg has entered upon a long career of successful operations. Grenser, of Dresden, has made known the results of a long visit to England in an able review of what he saw here; and ovariotomy is undoubtedly now becoming generally accepted by the profession in Germany as one of the triumphs of surgery.

The work of Grenser was published in 1870, entitled 'Ova-

riotomy in Germany;' and, as a workman feels the approval of his fellow-workmen, next to the consciousness of saving life, as his highest reward, it was with great satisfaction that I read the dedication to me, 'As a recognition of great services to science and mankind.' He gives the total number of completed cases of ovariotomy in Germany, up to the end of 1869, as one hundred and twenty-nine, seven uncompleted operations, and ten cases of mistaken diagnosis. Of the completed cases, sixty-two recovered, and sixty-seven died. The results of the three operators who had performed the greatest number of operations were somewhat better than the mortality of the whole one hundred and twenty-nine cases. Nussbaum had eighteen recoveries and sixteen deaths; Spiegelberg ten recoveries and six deaths; Stilling eight recoveries and nine deaths—a total of thirty-six recoveries and thirty-one deaths. These results, though very far from satisfactory, are a great deal better than those mentioned by Dutoit, who published, in 1864, tables of the results of ovariotomy in England, Germany, and France, giving the results of the operation in Germany as fifty-one cases, of which only thirteen recovered and thirty-eight died. There is good reason for believing that the results of ovariotomy in Germany, since the publication of Grenser's work, have continued to improve in proportion since 1870, as they did between the years 1864 and 1870. Billroth, for instance, writing in November, 1871, says:—'Up to the present time, I am tolerably contented with my results. I have personally no reason for supposing that the results will be less cheering in Vienna than they are in London. Hitherto, I have performed ovariotomy nine times, and only two of the patients have died—a mortality of only 22·02 per cent. The first four cases recovered one after the other; then two fatal cases occurred, to be followed again by three recoveries.' Knowing the position which Billroth holds among European surgeons, I cannot refrain from quoting the following passage from the lecture in which the above results are stated:—'After ovariotomy, skilfully performed according to the rules of art, recovery is the general rule; and a fatal issue the constantly diminishing exception. Comparing it with some other operations, ovariotomy, taking the mass of cases, is shown by statistics to be less dangerous than amputation of the thigh, disarticula-

tion of the shoulder and hip joints, or excision of the hip or knee. Its danger is about the same as that of amputation of the arm, excision of the shoulder, partial excision of the jaw, lithotomy in the young, and similar operations. We must, however, perform ovariotomy strictly according to the rules laid down by the English operators in their classical works; and only after having attained the same results should we venture practically to put in force our own ideas, in order to improve upon these. I had the good fortune to see Spencer Wells operate upon two complicated cases, and from them, as well as from oral communication with this remarkable man, I learned much. I constantly follow his precepts, knowing that he has long since thoroughly thought out and tested all that can happen to myself. I shall willingly regard myself during my lifetime as his scholar; and contented shall I be if it falls to my lot, by means of this operation, to snatch from certain death one-half the number of lives he has been enabled to save.' It would be almost impossible to resist the gratification—'laudari à viro laudato'—which any surgeon would feel in republishing remarks like these, coming from such a man as Billroth.

In the north of Europe, Dr. Sköldberg, of Stockholm, deserves the credit of promulgating, by his example and writings, the knowledge of the operation in Sweden. He published a treatise in 1867, after his return from a long visit to England, which, singularly enough, contains a more complete comparison of the relative mortality of ovariotomy in different London hospitals than can be found in any English work. He gives the statistics of ovariotomy in the following hospitals up to November, 1866:—

Hospital	Cases	Recoveries	Deaths	Mortality per cent.	Authority
St. Bartholomew's . .	12	4	8	66·67	Mr. Willett.
Middlesex . . .	8	1	7	87·50	Dr. Hall Davis.
King's College . . .	7	1	6	85·71	Dr. Priestley.
St. George's . . .	7	2	5	71·43	Dr. R. Lee.
University . . .	5	1	4	80	Mr. Erichsen.
Total . . .	39	9	30	76·92	

Dr. Sköldberg also gives the statistics of ovariotomy in Guy's

Hospital, on the authority of Dr. Braxton Hicks, as forty-four cases, with twenty-three recoveries and twenty-one deaths—a mortality of 47·73 per cent.; and he explains this mortality, so much *more* favourable than that of the other large hospitals, but so much *less* favourable than the results obtained by me in the Samaritan Hospital, and by Dr. Keith in a small private hospital in Edinburgh, by the fact that many of the precautions taken in the small hospitals are observed more carefully in Guy's than in the other large hospitals.

Dr. Sköldberg visited England again this year, and informed me that he had performed twenty-nine operations, with a result of twenty-four recoveries and five deaths. This success has naturally had a great influence in Sweden; and Dr. Howitz, of Copenhagen, and Professor Nicolaysen, of Christiania, who both assisted me many times, have done good service with their Danish and Norwegian countrymen. Arendrup, of Copenhagen, who had highly qualified himself by assiduous study here for the high position he appeared destined to fill in his native country, died too early—a victim to overwork in the Paris hospitals during the siege.

In Russia, the first ovariotomy was performed at Charkoff by Professor Vanzetti in 1846, and the second operation at Helsingfors in 1849, by Professor Haartmann. Both cases were unsuccessful. The first successful case was performed by Professor Krassowski, of St. Petersburg, in December, 1862, and his results were afterwards so satisfactory that, in 1868, he published the well-known atlas of beautifully-coloured plates, with full accounts of twenty-four cases in which he had completed the operation, and one case of partial extirpation. Of the twenty-four completed cases, both ovaries were removed in six—three successfully, and three followed by death. Of the eighteen cases where one ovary was removed, there were ten recoveries and eight deaths, giving a general total of thirteen recoveries and eleven deaths. Writing to me in 1868, Professor Krassowski most kindly assures me that my work had contributed much to the progress of ovariotomy in Russia. Professor Krassowski's example has been followed by many other Russian surgeons; and the operation may now be considered as thoroughly established in Russia. I shall have to allude hereafter to the important observations of Dr. Mas-

lowsky upon the pathological phenomena which follow the application of ligatures and of the cautery to a pedicle.

In Italy, the first successful ovariotomy was performed by Professor Landi, of Pisa, in September, 1868; the second, by Professor Peruzzi, of Lugo, in 1869; the third, by Dr. Marzolo, of Padua, in July, 1871. In his account of this operation, Dr. Marzolo says, that it is the sixteenth ovariotomy performed in Italy, the results having been three recoveries and thirteen deaths; and he joins with Landi in urging his countrymen, by courage and perseverance, to emulate the successes of their English brethren.

It is not easy to obtain information as to the number and results of cases of ovariotomy in Spain and Portugal, but there is reason to believe that they do not differ greatly from those of Italy.

In India, as early as 1860, ovariotomy was performed successfully at Tanjore, by a native surgeon. The particulars are given in the 'Medical Times and Gazette' of 1861. In Australia, the success of Tracy and of Martin has been equal to that of their English brethren. In New Zealand, Dr. Mackinnon was the pioneer of ovariotomy at our antipodes. In Canada, the few cases which have been published have been almost all successful; and there is already abundant evidence that ovariotomy may be practised successfully under the most different conditions, and in the most opposite climates.

It is impossible to give anything like a full historical sketch of the progress of ovariotomy in America within any reasonable limits. The initiatory work of McDowell has been already described. Atlee stands next to myself in the number of operations he has performed, which, at the time of writing this notice, must be nearly three hundred. Kimball of Lowell, Peaslee, Marion Sims, Storer, and many other American surgeons, have maintained the reputation of their country in this department of surgery. Works by Atlee and Peaslee have been announced, and their European brethren are looking with great interest for their own account of their work and that of their countrymen.

CHAPTER XI.

ON THE SELECTION OF CASES FOR OVARIOTOMY.

When ovarian cysts or tumours have attained so large a size that the comfort and general health of the patient are seriously interfered with, and where ordinary medical or palliative treatment has proved of little avail, the average duration of life certainly does not exceed two years, and these years are generally a period of great discomfort, possibly of extreme and hopeless suffering. Those cases in which, under expectant treatment, or after repeated tappings, life has been prolonged for many years, are rare exceptions to the above rule. Given their due weight they lead to some important practical conclusions, which may be summed up as follows :—

1. So long as an ovarian tumour does not materially interfere with the appearance, prospects, or comfort of the patient; so long as no injurious pressure is exercised by it on the organs of the pelvis, abdomen, and chest; so long as heart and lungs, digestive organs, kidneys, bladder, and rectum perform their functions without much disturbance; so long as there is no great emaciation, no very wearying pain, no distressing difficulty in locomotion; or so long as any such injurious influence can be counteracted by ordinary medical care, the patient should be left to that care, undisturbed by any surgical treatment.

2. All specific medical treatment, by iodine or bromine, or mercury, or lime, or potass, or by diuretics or other medicines used with a hope of checking the growth of ovarian cysts and tumours, or of leading to absorption of the fluid they contain, having been proved by ample experience to be absolutely worthless, no medical treatment should be adopted which can possibly injure the general health of a patient, or place her in a less favourable position than she otherwise would be for such surgical treatment as may ultimately be called for.

3. When, however, an ovarian tumour deforms a patient, or materially impedes locomotion, or interferes with the free action of heart or lungs, or obstructs the circulation through the large veins in the abdomen, or causes more or less constant and distressing pain, loss of rest or emaciation, or leads to derangements of the digestive organs, or makes injurious pressure on the contents of the pelvis, surgical aid is required.

4. The cases in which simple tapping, tapping and drainage, with or without injection, may be practised, and the mode of carrying out such treatment, have been described in Chapter IX. Treatment of this kind not appearing likely to be useful, or having been tried and proved of but temporary utility, ovariotomy is the only resource. In many cases it may be performed with a confident hope of a successful result, in others the probabilities of success or failure may be about equal, while in some the hope of success is so small, that most patients who are told the whole truth prefer waiting for the natural termination of the disease, to voluntarily placing their lives in immediate peril. Some, however, would press the unwilling surgeon to operate against his better judgment, and I have often yielded to the solicitations of patients who, their sufferings being great and death being inevitable at no distant period, have preferred running any risk rather than submit to a continuation of suffering to be ended by certain death. In only one case have I refused to operate when pressed to do so by a patient capable of appreciating the difficulties of the position. In this case, a woman in the Samaritan Hospital suffered, as I believed, from malignant disease, involving the uterus and both ovaries, and having a large quantity of fluid free in the peritoneal cavity ; I removed this fluid, but refused to do more, although the woman threatened to commit suicide if I did not operate. After her death, the correctness of the diagnosis was fully borne out. I have heard of some few cases where patients whom I had dissuaded from the operation have been encouraged by others to submit to it, and, with one exception, every such patient has died after operation. The exceptional case was a woman who had been several times tapped, and who had been advised both by Dr. Keith and by me not to think of ovariotomy so long as life could be made tolerable by tappings. Fifteen months after I

saw her the tumour was removed by Dr. Graham, of Liverpool, who encountered and overcame the pelvic and other adhesions which Dr. Keith and I had both recognised, and obtained the satisfaction of saving a life otherwise inevitably lost. I have thought it necessary to make this statement distinctly, because it has been supposed that ovariotomy has been restricted to favourable cases only, and that good results had been obtained by refusing to operate upon any but selected cases. Indeed, this was the case in the early days of ovariotomy in this country. Dr. Frederick Bird, for instance, published numerous cases where, after making a small incision, and finding the cyst adherent, he did not proceed with the operation; and Dr. Clay, of Manchester, does not appear to have performed ovariotomy upon more than an eighth of the patients with ovarian tumours who consulted him.

Before going into the numerical examination of the question as to how far the age and condition of the patient, the size of the tumour, the existence of adhesions, the length of the pedicle, and any other particulars which can be ascertained or made out with tolerable accuracy when the question of operation is discussed, have affected the result in the 500 cases upon which this volume is founded, I think we may conclude that this experience has now been sufficient to warrant the acceptance of some such rule as the following:—

The probable result of ovariotomy can be estimated with far greater accuracy by a knowledge of the general condition of the patient, than by the size and condition of the tumour.

In other words, a large tumour, extensively adherent, in a patient whose heart and lungs, and digestive and eliminative organs are healthy, and whose mind is well regulated, may be removed with a far greater probability of success than a small unattached cyst from a patient who is anæmic or leukæmic, whose heart is feeble, whose assimilation and elimination are imperfect, or whose mind is too readily acted upon by either exciting or depressing causes. I believe this to be the explanation of the facts which have led some superficial observers to assert that the more advanced the disease the greater, and the earlier the stage of the disease the less, is the probability of recovery. I am convinced that this reasoning is based on the observation of a few exceptional cases where small unat-

tached tumours have been removed with a fatal result from unhealthy persons; or where large attached tumours have been successfully removed from persons who have otherwise been constitutionally sound; but small unattached tumours in strong healthy persons by no means give the best results. It is possible to operate too early as well as too late—to place a patient's life in peril by operation before it is endangered by the disease; just as it is possible, on the other hand, to delay operation until the powers of life are so exhausted that recovery after a severe operation is impossible. In the same way, a strong man in full health, with a limb crushed by a railway accident or shattered by a bullet, bears amputation worse than another man who, on account of diseased knee-joint, has been confined to his room for weeks or months; or a woman who has become accustomed to the confinement of a sick room, has lost flesh, and has been brought by her suffering to dread the operation less than the disease, bears the removal of an ovarian tumour, even though large and adherent, better than one whose whole course of life is suddenly changed from the performance of ordinary active duties to the enforced quiet and confinement in bed which necessarily follow ovariotomy.

The *size* of an ovarian tumour has not, by itself, appeared to affect the result; but size and solidity together, by affecting the length of the incision necessary for the removal, appear to be of some importance. If there be but little solid or semi-solid substance present—which is generally easily discovered before operation—large adherent cysts holding fifty, sixty, or seventy pounds of fluid may be removed after the contents of the cyst have been evacuated through an opening only just large enough to admit one of the operator's hands. The result of such cases has been very satisfactory; but the mortality has been greater when longer incisions have been necessary. The number of inches is a very imperfect mode of judging of the length of incision in these cases; for in a small woman with a tumour of moderate size, an incision of eight or ten inches would extend almost from sternum to pubes; while in a large woman, whose abdomen is greatly distended by a large cyst, an incision of this length may be made below the umbilicus, and after the contraction of the abdominal wall, the cicatrix may not be more than three or

four inches long; so that, in examining a case for operation, it becomes important to judge whether a cyst or tumour can probably be removed by an incision which does not extend above the umbilicus. If this can be done, the probability of success is much greater than when it becomes necessary to extend the incision much above the umbilicus. On this point some further information may be found in the chapter on the Situation and Length of the Incision.

Adhesions.—In 296 cases there were no adhesions, or they were so slight as to be almost unnoticed; of these patients 237 recovered and 59 died, the mortality being 19·93 per cent. In 204 cases, adhesions were very extensive; of these patients 136 recovered and 68 died—a mortality of 33·33 per cent. This would show that the mortality of cases where there are considerable adhesions is about 13 per cent. greater than in cases where there are no, or only trifling adhesions. But a more careful examination of each case appears to confirm the conclusion at which I arrived some years ago, that adhesions to the abdominal wall, or omentum only, have but little influence upon the mortality, and that the importance which has been attached to the diagnosis of adhesions before operation has been greatly and unnecessarily exaggerated. At the same time the diagnosis of adhesions within the pelvis is of very great importance, as the attachments to the bladder or rectum may be almost inseparable without great and immediate danger to life. The same may be said of attachments around the brim of the pelvis, the separation of which would endanger the iliac vessels or the ureters. And the closeness of the connection between the uterus and the ovarian tumour—in other words, the length of the pedicle—becomes of great importance, as upon the length depends the possibility of keeping the end of the secured pedicle outside the peritoneal cavity, or the necessity for leaving it within this cavity.

Contra-indications.—As a general rule, any existing disease which in its natural course would prove fatal to the patient, or would influence her constitution in such a manner as to render her recovery very unlikely, or other serious surgical operations inadmissible, should also forbid ovariotomy. It ought not to be resorted to in individuals suffering from cancer, far-advanced tuberculosis or scrofula, syphilis, diseases of the heart, or in

cases where this organ has been displaced by the tumour, and at the same time has been fixed in its abnormal site by adhesions which would retain it in its position even after the removal of the ovary; diseases of the brain and of the nervous centres, of the liver, spleen, and kidneys; ulcers of the stomach and diseases of the alimentary canal, which permanently impair general nutrition; ascites in consequence of liver complaint, of disease of the heart, or degeneration of the kidneys. Scurvy, anæmia, and other blood diseases, hectic fever, great weakness and extreme emaciation from advanced age or impaired nutrition, would lead, if not to absolute prohibition, to a very unfavourable opinion as to the probable result.

But in few instances will the judgment of the surgeon be so severely tested as in estimating the value and importance of many of the above-mentioned contra-indications, whether any one is by itself so serious as to preclude surgical interference, or is merely a consequence of the local disease. This may be instanced by one of my cases where all the symptoms of far-advanced tuberculosis were present—cough, hectic fever, high temperature, and rapid pulse—which all disappeared after extirpation of the ovarian tumour. The pulse fell from 108 to 88, the temperature from 101·4° F. to its normal range; cough was no longer troublesome. It may be added that the cyst contained genuine tubercular deposits, was thin-walled, and very fragile.

The operation ought not to be performed if well-founded suspicion is entertained of the tumour being cancerous. Cancer of the ovaries is supposed to occur most frequently after the change of life; but cases have been mentioned, in another chapter, of this disease in a young girl, and in middle-aged women. Such tumours often form extensive and intimate adhesions, infiltrate the surrounding tissues, and attack the neighbouring organs, with which they form at an advanced stage of the degeneration one confluent mass. In most cases, their extirpation, if attempted, would meet with insurmountable difficulties; and should the operation be terminated and the patient recover from it, the disease would sooner or later attack some other part or organ. Ascites generally accompanies malignant disease of the ovaries, and both ovaries are usually affected at the same time.

The presence of ascites need not deter from the operation, provided it be due to escape of fluid from the cyst, or is brought on by the mechanical irritation of the peritoneum by the tumour. If, however, it is caused by disease of heart, liver, or kidneys, these conditions forbid the operation. The complication of pregnancy with ovarian disease, and its bearing on ovariotomy, have been treated of in a former chapter.

In order to examine the influence of the *age* of a patient upon the result of ovariotomy, I have prepared the following table, which shows the ages of five hundred patients upon whom this operation was completed, with the result :—

Ages	Cases	Recoveries	Deaths	Mortality p. cent.
15—20	12	12	0	0
20—25	52	43	9	17·3
25—30	72	54	18	25
30—35	69	47	22	31·88
35—40	65	48	17	26·15
40—45	74	62	12	16·21
45—50	55	37	18	32·72
50—55	62	41	21	33·87
55—60	31	22	9	29·03
60—65	6	5	1	16·66
65—70	2	2	0	0
	500	373	127	25·4

The small mortality shown in patients below the age of twenty-five and above the age of sixty, and the comparatively high mortality between those ages, except from forty to forty-five, are remarkable.

Conjugal Condition.—Of these five hundred patients there were—

		Recovered	Died	Mortality per cent.
Married . .	279	204	75	26·84
Unmarried . .	221	169	52	23·52
	500	373	127	25·4

This shows that the mortality was nearly equal among married and unmarried women at all ages.

Social Condition.—I need not say that the results of operations in hospital and private practice are affected by many other causes besides the social condition of the patients; but

it may be of some value in ascertaining the effect of modes and habits of life of patients upon the mortality of ovariotomy to state, that of the five hundred cases there were—

		1st Hundred.		
		Recovered	Died	Mortality per cent.
Hospital . .	54	38	16	29·6
Private . .	46	28	18	39·1
		2nd Hundred.		
Hospital . .	39	27	12	30·77
Private . .	61	45	16	26·23
		3rd Hundred.		
Hospital . .	52	41	11	21·15
Private . .	48	36	12	25
		4th Hundred.		
Hospital . .	44	30	14	31·84
Private . .	56	48	8	14·28
		5th Hundred.		
Hospital . .	51	39	12	21·05
Private . .	49	41	8	16·32

		Recovered	Died	Mortality per cent.
Total Hospital cases	240	176	64	26·66
Total Private cases	260	197	63	24·23
	500	373	127	25·4

Influence of Season.—In the first 200 cases the mortality was rather lower in the spring and summer than in the autumn and winter months. It was highest in December and January, but it was lowest in November and March. Hence, looking to the small difference between the mean temperatures of November and December—the months of lowest and highest mortality, or between January and March—the months of the next highest and lowest mortality, it seems probable that the result of ovariotomy is more influenced by some exceptional atmospheric and climatic conditions than by the season when it is performed. And this opinion is confirmed by the results of the 300 cases which succeeded the first 200, for in the third hundred the greatest mortality was in November, while in the fourth and fifth it was pretty equally distributed over the whole year.

CHAPTER XII.

PREPARATION OF A PATIENT FOR OVARIOTOMY; DUTIES OF THE NURSE; DESCRIPTION OF NECESSARY INSTRUMENTS.

One condition which certainly requires correction before the operation is undertaken, is that common one where only a small quantity of highly concentrated urine, depositing mixed urates in abundance, is passed. If ovariotomy be performed on a patient in this condition, a serious amount of kidney congestion, with symptoms almost amounting to uræmic fever, are almost certain to follow the operation. Before undertaking it, therefore, it may be necessary to gain time by tapping. Whether or no this may be necessary, warm baths or vapour baths, to promote free cutaneous secretion, something to secure a free daily action of the bowels, and some of the alkaline carbonates, largely diluted, will most likely greatly improve the condition of the patient. Nothing tends so rapidly to clear the urine as lithia. One or two bottles of lithia water—either the liquor lithiæ effervescens of the Pharmacopœia, or the lithia water of the shops, which contains 5 or 10 grains of citrate of lithia to each bottle, or from 5 to 10 grains of the citrate or carbonate of lithia, dissolved in a full proportion of simple or aerated water, two or three times a day, generally lead to a more abundant secretion of urine which is free from deposit. Sometimes it is a good plan to combine the carbonates of lithia, potash, and soda together, and sometimes it may be desirable to give iron at the same time. A draught of 5 grains of tartrate of iron, 5 of carbonate of lithia, and 10 each of the bicarbonates of potash and soda, with a few drops of chloric ether, two or three times a day, has often appeared to me to be of great service. Simpson was strongly in favour of a course of perchloride of iron before ovariotomy, or any other serious surgical operation. He thought it so altered the condition of the blood as to make pyæmic fever or septicæmia much less liable to occur. A change to

the seaside or country will, of course, assist the restorative action of medicines; and if the patient live in the country it may be as well to arrange for the performance of the operation at as early a period as possible, before the influences of town life have had time to prove injurious.

But it by no means follows that the state of robust health is one so favourable for operation, as a state in which the patient is more or less accustomed to the quiet and habits of a sick room. A young, strong, healthy person, much of whose time is passed in open-air exercise, does not bear so well the enforced quiet of a sick room as the patient who has become gradually habituated to it. And it is perhaps one of the most difficult questions which the surgeon has to determine, whether the patient is suffering enough in general condition to warrant him in recommending an operation necessarily attended with serious risk to life, and yet not so far broken down by the progress of the disease as to lessen the chances of recovery after operation. Every case must be judged by its own peculiarities; not those only which relate to the physical condition of the patient, but the various moral, mental, and social influences which have so constantly to be considered in daily practice, and which so materially affect the results of any operation. For instance, an unmarried girl with ovarian disease is often so distressed by the suspicions which her appearance excites, that she must be relieved earlier than a married woman of the same size need be; and a girl engaged to be married, and naturally unwilling to marry as an invalid, may claim with good reason earlier aid from surgery than one not so pledged. The same would hold good with a wife wishing to travel with her husband, or to join him in some distant part of the world. On the other hand, there are family circumstances which would properly delay operation till the last possible moment. Children may be dependent on the annuity of the mother, whose life should not be subject to the additional risk of the operation until it is imperatively called for by the severity of her sufferings. In many cases such considerations have guided me in operating either earlier or later than one would do if only obliged to regard what was best for the bodily welfare, and able altogether to ignore the affections, interests, and circumstances of patients.

The place where the operation is performed ought to be healthy, and, as time is generally at our command, there can be no excuse for putting or leaving the patient in an unhealthy house or district. If she lives in a healthy part of the country and can be treated there, it would be positive cruelty to bring her to an unhealthy part of town, or to expose her to the influences of a large general hospital. Even in the same town, or in the same district of large cities, better results have been obtained in private houses and in small hospitals, where the patient occupies a room alone, than in large general hospitals, where she must share a ward with other patients, and may be subject to the influences of dissecting students. At the Samaritan Hospital, where there are seldom more than twenty and never more than thirty patients, and where every patient subjected to ovariotomy has a room and nurse to herself for a week after operation, my own results have at times shown a considerably greater mortality than in private houses; and I have found in a private nursing institution, where each patient had also a separate room, that the mortality was as great as in the Samaritan Hospital. In the fourth series of one hundred cases the mortality in private practice was only 14 per cent., while in hospital it was 31 per cent. But on the whole series of five hundred cases there is only a difference of little more than 2 per cent. in favour of cases in private practice. In the first one hundred the advantage was in favour of the hospital as much as 10 per cent., and in the fifth hundred fully 7 per cent. in favour of the private. And it is well worthy of remark that the periods of good and indifferent results in hospital have corresponded with improvements in its sanitary condition. After emptying the hospital for a month or more, and thoroughly cleansing, painting, and lime washing the wards, a period of almost uninterrupted success has followed. Then what was called 'a run of bad luck' set in, clearly attributable to crowding, some neglect in purifying bedding, or to contagion or infection. Another thorough cleansing again led to more favourable results, and in the six months from December 1871, after complete repairs, to July 1872, of twenty-four cases only two died and twenty-two recovered. But this mortality, though much larger than that in private practice, is very much smaller than anything yet attained in any large general hospital. If we

could obtain all the favourable conditions of a room in a private house, in a healthy country situation, there can be no doubt that the mortality would be much smaller than the most favourable results hitherto attained. Nothing can more strikingly exemplify this than the returns obtained by Dr. Sköldberg, of Stockholm, which may be found at page 312. And the question seriously presents itself whether ovariotomy or any other surgical operation, attended with risk to life, should ever be performed in a large general hospital, in a large town, except under such circumstances as would render removal to the country or to a suburban cottage hospital more dangerous.

The ward or room, whether in a small hospital or in a private house, should be well provided with means for keeping up a continual and sufficient ventilation, without exposing the patient to currents of cold air, and the temperature should be regulated by an open fire. In a building specially constructed for the purpose, it would be perfectly easy to keep up a constant current of fresh air, at any temperature required, night and day; but the knowledge of the architect and the art of the builder are very far behind the scientific teaching of the day, and what is theoretically easy in warming and ventilating a house has probably never yet been done well. All unnecessary furniture should be removed from the room, particularly dusty woollen curtains and carpets. Instead of a bed with heavy draperies, two iron bedsteads should be provided, not more than three feet six inches wide, so that the patient can be reached equally well from either side, and may be lifted from one bed to the other, if desirable. A horsehair mattress is cooler and firmer than a feather bed, and therefore preferable. The covering ought to be light but warm; and no one should be allowed in the room but the patient and her nurse.

The nurse has a very important influence on the result of ovariotomy. Much depends on her scrupulously regarding all the essential precautions, and judiciously managing for the comfort and encouragement of the patient, up to the time of the operation; and the after treatment can be altogether marred by any failure of discipline, or neglect in fulfilling every little point of the duties entrusted to her. What is especially wanted in a nurse for this kind of work is a calm, quick, decided way of doing it; an intelligent understanding of

its nature ; a readiness in comprehending the instructions given ; punctuality and exactness in carrying them out ; and a discriminating carefulness in observing and reporting all that passes under her notice, and may be of importance in judging of the progress or regulating the treatment of the case.

There is at the present time a fair, free, and remunerative field for the exercise of these combined qualities, which, after all, are not so rare as might be supposed, though they develope more notably in a stratum of society where one would not at first thought have expected to find them. As a rule, ladies in search of an occupation for a livelihood, or who take to it because they know not what else to do, or who fall into it by sentiment or accident, seldom succeed in nursing well. There is generally a lurking sense of degradation which takes the spring out of their work, and throws over it an undefinable but appreciable air of taskiness which has its influence both upon patient and surgeon. Whereas for the most part a nurse who has changed from the business of ordinary domestic service feels that she is making a step upward in life, and goes about what she has to do with a kind of professional *élan* and personal interest in its success. A young woman of this class has already fallen into habits of cleanliness, order, and submission ; she knows from experience in her own family the way the poor manage for themselves, and she has had opportunities of observing the wants and indulgences which slide into the list of necessaries among the luxurious. She has acquired in her calling a certain dexterity in the arranging, handling, and cleansing all the usual utensils and appliances of a sick room, and a sort of chamber ease and conformity in her movements which only come after practice in household duties. Her mind, too, from acting habitually under orders, and in obedience to rules, and under a light weight of responsibility, has generally become pliant, receptive, responsive, and forecasting. It is comparatively easy to graft on a stock so prepared the additional qualifications required for making a good nurse, and it certainly is worth the while for anyone much engaged in operations of the kind we are dealing with, to train in his own ways those whose co-operation he wants, both for his own comfort and the welfare of his patients. The passive, confiding docility of women after ovariotomy, who find themselves subject to the

entente cordiale which exists between a competent nurse and the surgeon she is serving under, is in marked contrast with the keen, anxious watchfulness and feverish fidgetiness of others less fortunate in their attendants, and their progress towards convalescence is promoted or retarded in such a way as to make very clear how much the style of nursing has to do with it.

No nurse should be entrusted with the care of a patient after ovariotomy unless she is perfectly well able to use the female catheter without uncovering her person and exposing her to chill. She should use the catheter every six or eight hours, or as much oftener as the patient may wish, and should preserve the urine, but not in the sick room, for the examination of the surgeon. She should also be well practised in injecting medicine or food into the rectum, and in clearing the rectum by injections when necessary. She should know the danger and the mode of avoiding bed-sores. She should understand the importance of thoroughly cleansing and freeing from every particle of sand, and deodorising or disinfecting, every sponge which is to be used during or after the operation, and on any day of operation she should have at least twenty soft sponges, when moist about the size of the double fist, not quite but nearly dry, before the arrival of the surgeon. She should also have prepared several strips of adhesive plaster, about two inches broad, and long enough to more than half encircle the body; a supply of lint, cotton wool, some small muslin bags filled with absorbing and deodorising powder, such as Skinner's, which consists of 95 per cent. of powdered calcined oyster shells, and 5 per cent. of oil of tar; an india-rubber bag filled with hot water should be ready for use; a flannel belt to pin round the body, and some large safety pins to fasten it. Some brandy, one or two pint bottles of champagne, some ice, a small enema bottle, holding an ounce, with an elastic tube, should be provided, a minim measure and some laudanum, so that in case of pain a dose of it may be injected into the rectum, and a feeding-cup, so that barley-water, beef-tea, soda-water, with or without milk, may be given without the patient rising.

The temperature of the room need not be so high as was formerly supposed indispensable, nor need any attempt be made to charge the atmosphere with moisture. In the first paper on five cases of ovariotomy which I brought before the Medical

and Chirurgical Society, I already expressed my belief that many of the symptoms, supposed to be caused by the operation, were in reality due to the confinement of the patient in a hot, close room filled with watery vapour, and showed that both patient and surgeon were very much more comfortable in an ordinary atmosphere. Perhaps the temperature of the room should not be below 65° Fahrenheit, but it need not be raised to an uncomfortable degree above this point. The patient should wear her ordinary night-dress, warm woollen stockings, and a loose, short flannel dressing-jacket. Anything tight round the neck or body should be removed. Even if the bowels have acted on the morning of the day selected for operation, the rectum should be thoroughly cleared out by an injection of warm water. She should not eat anything for four hours before the anæsthetic is administered, and a little good beef-tea, with dry toast, will be enough for the morning meal. I find about two or three in the afternoon a better time for operating than an early morning hour. A patient who expects to undergo an operation early in the morning seldom sleeps well, or awakes wearied and depressed; but if she is to get up to breakfast and does not expect her fate to be decided till the afternoon, she sleeps better, and there is time for clearing the bowels after breakfast. If she has had a warm bath the night before, her skin is in a better state for perspiring. It is always well to know the morning and evening temperature of a patient two or three days before operation, and it is very important the nurse should be properly instructed in the use of the clinical registering thermometer.

Tables on which the patient is to lie for the operation, and another table for the instruments, should be placed opposite a window admitting a good light, with foot pans or pails beneath for the reception of the fluid. The nurse should have a good fire in the room, a plentiful supply of hot and cold water, and see that everything is in such readiness, that, after the patient is in the room, it may not be necessary to send for anything, or to open the door. With some few unusually nervous patients it may be desirable to administer the anæsthetic in another room, or in bed in the same room, before she is placed on the table; but, as a rule, patients may generally walk to the table and arrange themselves upon it,

with some little assistance, in the position desired by the surgeon. The night-gown should be pressed up towards the shoulders. In order to have as few assistants as possible, a broad strap should be carried over the patient's knees, and around the table, and tightly fastened. The hands should also be securely fixed by straps; the head should be laid in a comfortable position on pillows; and, except the abdomen and face, the whole body should be covered with warm light blankets or flannel. The abdomen should be covered by a waterproof sheet, with an opening about eight inches long and six inches wide in the middle; the inner surface with a coating of adhesive plaster of about an inch in width all round the opening, so that it may adhere to the skin, and prevent any exposure of the patient, while her body and clothing are kept perfectly dry and clean.

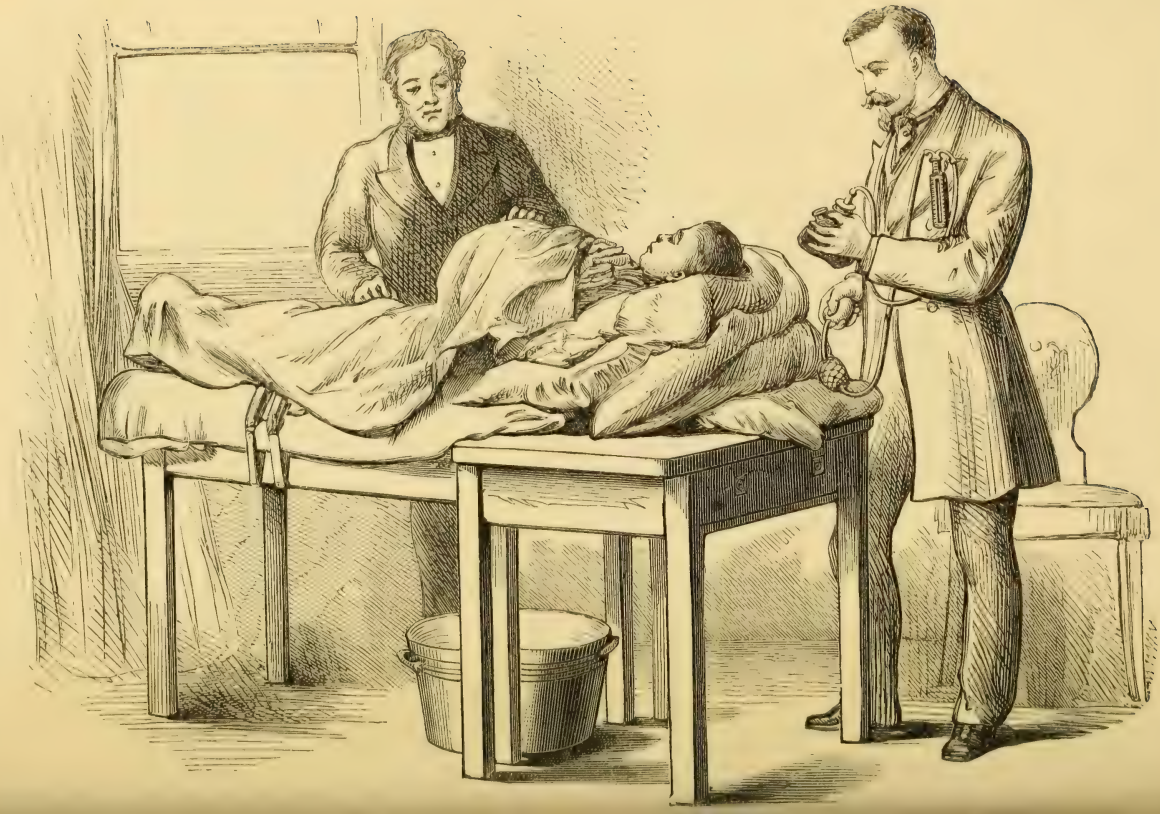
In Simpson's Lectures on Ovariotomy, published in the 'Medical Times and Gazette,' and recently re-published in his Collected Works, this drawing, which I prepared for

him, was introduced to show the couch on which I performed a great many of my earlier operations. The positions

of patient, operator, and administrator of chloroform are distinctly shown. Most surgeons who had operated before me, and many do so still, placed the patient in a sitting position, near the edge of the bed, with her legs widely separated, and her feet supported on stools, her back and head resting on pillows. I followed this practice in my first three cases, but it was so difficult to keep the patient properly covered, she was so apt to become faint under the influence of chloroform, there was so much difficulty in preventing the protrusion of intestines, and in completing satisfactorily the various steps of the operation, that I tried the recumbent position in my fourth case, and have kept to it ever since.

The couch shown in the above wood-cut is a very convenient one, but it becomes troublesome to carry it about from house to house; and some narrow table, or two ordinary dressing tables, may be found in every house, which answer the purpose equally well. The drawing on the next page shows how I am now in the habit of arranging two such tables near the window, with the patient covered upon them; the table for the instruments being to the right hand of the operator.

The necessary instruments for a simple case of ovariotomy are extremely few: a scalpel, to divide the abdominal wall; a director, to protect the cyst as this division is completed; a trocar, to empty the cyst; a clamp, to secure the pedicle; needles and silk, to close the wound; with forceps and ligatures, to secure any bleeding vessels, complete the list. But there is, perhaps, no surgical operation where the surgeon may be so met by difficulties where he least expected them, and it so often happens that instruments are wanted which would not be at hand if only the instruments required for an ordinary case were taken, that it is a safe rule to take to every case a full supply of instruments, to meet every possible emergency. Clamps of different sizes, cautery clamps and cauteries for cases where the clamp is not applicable, ligatures and needles of different shapes and sizes for cases where neither clamp nor cautery effectually deals with the pedicle, large hare-lip pins or acupressure needles for cases where simple ligatures cannot be trusted, clamps with screw fastenings to the handles for temporarily securing separated omentum or torn vascular adhesions, artery forceps of different lengths, torsion forceps,



bull-dogs, vulsella specially adapted for holding large cysts, a chain and wire écraseur, drainage tubes of glass, vulcanite, or india-rubber, and perchloride of iron should always accompany the surgeon. Only the instruments which the operator thinks likely to be required need to be arranged on the table to his right; all others in reserve should be placed ready for use in a drawer, or on a tray, out of the way, but close at hand. All this having been done, and the table with the instruments covered with a towel, the light of the room subdued, and no other person present than the operator, the administrator of the anæsthetic, and the nurse, the patient may be brought into the room.

Before proceeding to describe the various steps of the operation, a few lines may be given to the consideration of the anæsthetic used, and to an account of the most important instruments.

In all my earlier operations chloroform was the anæsthetic used. Vomiting following the operation so speedily, and continuing, just as after other operations, with the distressing persistency known as 'chloroform sickness,' was very frequently observed, and in some cases led to great danger, and even became a principal cause of fatal results. I tried sulphuric ether; but the large quantity used, the diffusion of the vapour throughout the room, the irritating cough it produced, and the difficulty of inducing complete anæsthesia by it, induced me to search for a better anæsthetic. I tried a mixture of chloroform and ether in different proportions, but soon became aware that the patient was at first only affected by the lighter vapour of the ether, and was then subjected to the action of chloroform just as she was least able to bear it. The addition of alcohol to this mixture, given by Mr. Robert Ellis with the apparatus he devised, appeared to answer better than the simple mixture of ether and chloroform; and I was trying this mixture when Dr. Richardson brought his experiments with the bichloride of methylene before the profession.

An impression has prevailed that, while bichloride of methylene may be usefully employed in operations on the eyes, it is not an agent of very extensive utility, nor likely to supersede the use of chloroform in general surgery. And I have seen and heard several statements to the effect that, like nitrous oxide

gas, the bichloride of methylene—or chloromethyl, as it may be more conveniently called—is only useful for short operations, and that it cannot be safely administered for more than one or two minutes. But as my experience would show that this commonly expressed opinion is the very reverse of the truth, it seems to be my duty to make known what I have seen of the use of chloromethyl in general surgery.

The first surgical operation in which chloromethyl was ever used was a case of ovariotomy, which I performed in October, 1867. It was administered by Dr. Richardson himself; and in his report to the British Association in 1868, he says :—'After subjecting myself to the action of the vapour to the production of perfect insensibility, I ventured to administer it for surgical purposes on the 15th of October last. The sleep produced was of the simplest and gentlest character, and the operation performed by Mr. Spencer Wells, which lasted thirty-five minutes, was quite painless.'

This was my 229th case of ovariotomy. I have now done ovariotomy more than five hundred times; and, with the exception of about ten where, for some reason or other, chloroform was used, chloromethyl was the anæsthetic employed in every case, about 280 in number. In some 35 other cases of gastrotomy, and in more than 100 operations of more or less severity—such as herniotomy, amputation of the breast, removal of mammary or other tumours, or of hæmorrhoids, and plastic operations for the cure of vaginal fistula or ruptured perineum—chloromethyl has been administered for me, either by Dr. Richardson himself or by my colleagues, Dr. Junker and Dr. Day. In very few of these operations was the condition of insensibility to pain maintained for less than five minutes. In a few, it was kept up from forty-five minutes to an hour or more; and I should think the average would be about fifteen minutes. Yet I have never been at all uneasy in any one of these cases, more than 350 in number, either during the administration of the anæsthetic or from any subsequent ill-effects fairly referable to it. Whereas, with chloroform I never felt quite at ease; and, although I never lost a patient during operation, I have three times had to resort to artificial respiration, and I have very often seen patients suffer so much from chloroform-vomiting for many hours after operation, that the result has been imperilled, and in some cases

a fatal result has been in a great measure due to the vomiting. It is quite true that chloromethyl has also 'the disadvantage of causing nausea and occasional sickness;' but, in my experience, this is almost the rule with chloroform, whereas with chloromethyl it is certainly exceptional.

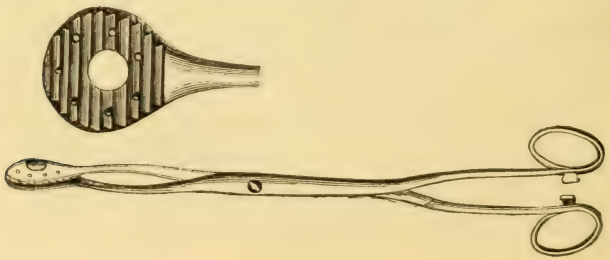
When I add that between April, 1870, and March, 1871, I had thirty-two successive cases of ovariotomy in private practice without one death, and that the last twenty-four cases of the fifth hundred, including both hospital and private cases, all did well, every patient having recovered,—it must be admitted (as anæsthesia was complete in every case, not one patient having been conscious at any stage of the operation) that the anæsthetic employed is a good one. In some cases less than two drachms was used, and very rarely more than six drachms. Dr. Junker's apparatus was generally employed; and Mr. Krohne tells me that many practitioners on the Continent, in America, and in different parts of our own country, who have ordered it from him after seeing it in my practice, have used it without difficulty, and have been well pleased with the results. Administered by the apparatus devised by Dr. Junker, a patient may be kept in a state of perfect unconsciousness throughout a prolonged operation. Scarcely any of the vapour escapes into the room; neither the surgeon nor the assistants are affected by it; a patient very seldom becomes pale, she sleeps quietly, awakes quietly, is not often sick, and seldom has much bronchial irritation referable to the chloromethyl. Indeed, she gains all the advantages of complete anæsthesia with fewer drawbacks than I have ever obtained by the use of any other anæsthetic.

The trocar used in ovariotomy by all the earlier operators was an ordinary trocar of full size. When Mr. Thompson's instrument came into use for ordinary tapping, I had one enlarged and lengthened for ovariotomy; and when I had learned the advantages of the syphon trocar, which has been described in the chapter on Tapping, I also enlarged this for use in ovariotomy. Then, finding that the cyst was apt to slip off the trocar, or that the fluid would escape between the perforation in the cyst and the canula, I had roughened rings adapted to the canula, so that the cyst might be securely tied, fixing it to the canula, preventing the escape of fluid, and serving as an aid in drawing out the cyst. This occupying too

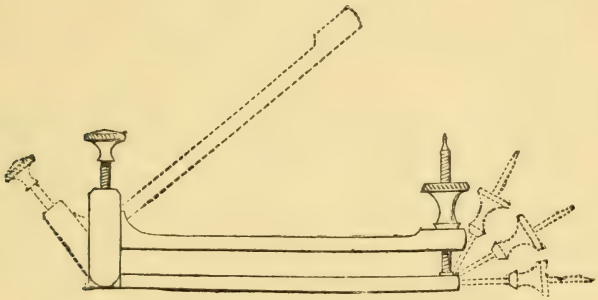
much time, I had two spring handles, each furnished with a series of hooks, adjusted outside the canula, by which the emptying cyst could be immediately fastened to the canula; and this instrument, now sufficiently well known and described as my ovariotomy trocar, I have used for several years past, and have been well satisfied with it.

Last year, Dr. Fitch, of Portland, in the United States, showed me a modification of the instrument, which appears to be an improvement. Instead of the inner tube having a cutting point, which for protection is withdrawn into the outer tube or canula, as soon as the cyst has been perforated, Dr. Fitch made the outer tube cutting, and protected it by pushing the inner tube forward. He also lengthened and curved the end of the canula upon which the tube is fixed, with the object of gaining a sort of pistol handle, rendering the instrument more manageable, and enabling us to use an ordinary india-rubber tube, without fear of stopping the current by its bending. This instrument is very well made by Krohne. Whether my old ovariotomy trocar or the instrument with this modification of Dr. Fitch's be used, a cyst is punctured, when partly empty is fixed on to the canula by the spring hooks, so that trocar, ligature, and vulsellum are united in one instrument, and a large cyst may be rapidly emptied and readily withdrawn, without any fear of its contents escaping either into the abdominal cavity or about the patient.

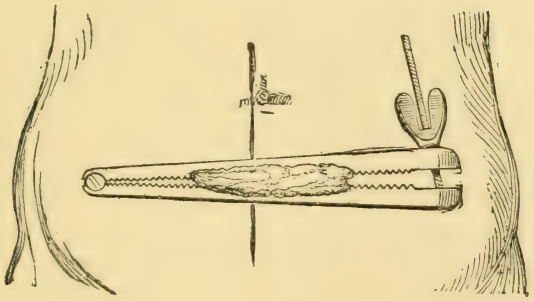
As aids to the hooked trocar in drawing out a cyst, or in holding a cyst which has been opened outside the abdominal cavity, while the septa of inner cysts are being broken up and the contents brought out, hooked forceps, or vulsella of different kinds, are often necessary. The best of these instruments is that made by Mathieu, and known as Nélaton's vulsellum. It holds the cyst very securely, does not slip nor tear the cyst. The essential or grasping part of the instrument is here shown.



The clamp first introduced by Mr. Hutchinson was the carpenter's common calliper. His first improvement was to make the handles moveable. My first attempt to improve upon this instrument resulted in the manufacture of two fenestrated blades, which were made to exert parallel compression by a screw at each end. This instrument is still described as my clamp, and the original sketch of it here given has been



copied by Simpson and other writers. It forms the basis of the clamps known as Dawson's and Atlee's, both of which have been successfully used in America. They appear to me, however, to be too slight in construction; and I very much prefer my own simpler form of the instrument, even although it may be necessary to compress some of the wide, uneven, and expanding pedicles, before finally fixing the clamp.



This drawing was published in 1858. It shows the first attempt at a parallel clamp before I added a screw at each end, and it shows very well how a pedicle not subjected to circular constriction would be so elongated from side to side as to prevent closure of the wound. But Atlee has

added holes for pins, by which the pedicle can be compressed, or prevented from extending laterally, as the clamp is tightened. I had tried to attain the same end by carrying a ligature through the fenestræ of the blades, and making circular compression upon the pedicle while the screws were bringing the blades together. Without some precaution of this kind, the pedicle is so expanded that it becomes a serious impediment to entire closure of the wound; and if one part of the pedicle is thicker than another, the thicker part interferes with the complete compression of the thinner, which is then apt to slip.

After using this instrument for some months I found it less easy of application than the modified calliper clamp, and I made some improvements in the latter, trying three different forms of moveable connecting joint, different forms of the compressing surfaces, from the perfectly smooth and flat to grooves and ridges falling one into the other, or a convex surface received into a concave, or one where a projection in the centre was received into a corresponding hollow; and I found the most trustworthy was that suggested by Küchenmeister of Dresden, where oblique ridge and furrow on one blade exactly meet the corresponding elevations and depressions on the other. If properly made, these surfaces, when pressed together, will not allow a piece of fine tissue paper to be drawn between them. The smooth arc not affording a sufficient hold upon the screw, the upper surface of the arc was roughened. The straight instrument lying awkwardly after application, and sometimes causing painful pressure at its angles, I had it curved and all the edges carefully rounded off. Various modes of fixing moveable handles were tried, and none proving very satisfactory, I substituted a large pair of forceps for the handles, so made that it would fit clamps of all sizes, and one pair of forceps serve for any number of clamps. Additional thickness was given to that part of the blade in which the screw passes through to the arc. When well made this instrument holds very securely in most cases where a clamp can be applied, but occasionally the auxiliary aid of a ligature is necessary: for instance, if the pedicle be made up partly by the thickened Fallopian tube or utero-ovarian ligament, and partly by thin membranous expansions of the broad ligament running towards

the colon or cæcum, the clamp alone is not trustworthy. The thin part of the pedicle is not compressed because the thicker parts of the pedicle keep the blades too far apart ; and after the cyst is cut away the thin portion of the pedicle is very apt to slip inwards. I have seen very troublesome bleeding arise in this way, which might easily have been prevented if the circular compression of a ligature had been exerted before the application of the clamp. I attempted to make a circular clamp, and different makers tried to carry out my wishes, but the only promise of success was from one made for me by Meyer. After occasionally using this instrument I found that it would cut through some varieties of pedicle just like scissors. I had more than once to suppress troublesome bleeding, so that after a short trial of this clamp I returned to the use of the calliper clamp, with the modifications which I have described. The mode of applying the clamp will be shown when the various plans of dealing with the pedicle are considered.

The clamp which is used for temporary compression of the pedicle when we intend to trust to the cautery for stopping bleeding from the divided vessels of the pedicle, is known as the Cautery Clamp. The original instrument was devised by Mr. Clay, of Birmingham, in order to stop bleeding from vessels in the omentum, which had been adherent to and separated from the cyst. It is to him we are indebted for the principle of combining compression and cauterisation in the suppression of hæmorrhage. The cautery clamp not only securely holds the pedicle, but so firmly compresses the portion included within the blades, that alone it would be almost sufficient to control the bleeding from any vessels not large ; but when the divided edge of the pedicle is seared by the actual cautery, the effect of compression is assisted by the line of eschar or plugging formed at the cauterised part ; and the blades of the clamp being necessarily heated during the application of the cautery, the compressed part of the pedicle is also heated, the blood in its vessels is coagulated, and when the clamp is removed, if this has been done carefully, and the compressed and heated tissues are not disturbed, a thin band almost like wash-leather, with the seared edge becomes a very efficient safeguard against bleeding. Soon after Mr. Clay described the successful application of his cautery clamp in suppressing bleeding from torn adhesions

and separated omentum, Mr. Baker Brown was the first to apply it to the pedicle. He improved the instrument by making it broader, by adding a guard to prevent slipping of the cautery, and an ivory shield to protect the soft parts from the action of the heated clamp. His results were so successful that I tried the method; and, after a case or two, curved the handles, altered the joint, substituted a better non-conductor for ivory, and used the galvanic cautery and the gas cautery, instead of the common irons. The only improvement upon this instrument which I have seen is one by Dr. Sköldberg, of Stockholm, which makes the action of the blades more parallel. Pratt carried out the same idea for me many years ago, and Dr. Braxton Hicks had also contrived a parallel bladed cautery clamp, which I used with fair success.

The cauterising irons used by Mr. Baker Brown were the ordinary conical irons, with a sharp edge, used in firing joints. With these instruments made red hot in the fire, he divided the pedicle, as shown in this cut; the tumour being held up by an

assistant. This was a tedious and troublesome process; and I found that the same end was attained by cutting away the cyst half-an-inch or so from the clamp, and then burning away all the tissue that projected beyond the surface of the clamp. Flat irons answered this purpose better than the conical ones; and nothing answers better than the common spatulas used by druggists in spreading plasters. The galvanic cautery answers equally well, and when it is inconvenient to have a fire in the room, would be generally preferred, if it were possible always to secure efficient battery action; but as this is uncertain, the gas cautery of Nélaton, either simple, or with the addition of the blow-pipe and the platinum capsules devised by the late Mr. Alexander Bruce, answers equally well; and Meyer once made for me a platinum cautery, with a spirit lamp to heat it, which was also as satisfactory in its action as the hot irons. I believe it is of very little consequence which of the cauteries is used, provided the clamp exerts sufficient compressing force, and time is taken to cauterise slowly, so that the pedicle is subjected to the somewhat prolonged influence of heat.

The ordinary chain écraseur has been used several times successfully in dividing the pedicle. I believe I was the first to adopt this practice, but although the case proved successful, I was so fearful of secondary bleeding that I have never repeated the experiment. When the écraseur is used, not to divide the pedicle but simply to secure it as a kind of clamp, the chain with a nut and screw is made so that it can be removed from the handles and left upon the abdomen just like a clamp. I once tried wire-rope in this way, instead of a chain, but found it so difficult to fasten it tight enough without cutting that I gave up its use altogether.

In Chapter IV. some remarks may be found upon the rotation of ovarian tumours and the twisting of the pedicle, and I have already alluded to cases which have occurred in my own practice where, long before the operation, the pedicle had given way and the cyst had received its whole blood supply through omental vessels. There can be no question, therefore, as to the feasibility of tearing through a pedicle, or of twisting off an ovarian tumour. Maisonneuve was the first actually to practise this twisting in ovariotomy; he twisted the cyst round and

round until the pedicle gave way. Macleod, of Glasgow, has improved upon this practice, and Hilliard, the Glasgow surgical instrument maker, has modified some of the instruments used by veterinary surgeons in castration, in order to hold the pedicle securely with one hand while the cyst is held and twisted with the other. Macleod has had one successful case, and his example has been followed with good results in Leeds. It is possible that there may be cases where the clamp is not applicable, and where this method may be preferable to the ligature or the cautery, but I can say nothing on this point from personal experience.

As it is never improbable, by whatever intra-peritoneal method the pedicle may have been secured, that bleeding vessels low down in the pelvis may have to be found and secured where, the patient lying opposite the light, the pelvis is necessarily in deep shadow, the surgeon should always be provided with a hand mirror to reflect light to the bottom of the pelvis. On a clear day this gives quite light enough, but in any foggy, dark, or cloudy weather, or when operating late in the day, a candle lamp, with a reflecting concave mirror, often becomes very serviceable.

With regard to the other instruments, it can only be necessary to add, that the surgeon should be prepared with scalpels, a probe-pointed bistoury, a broad Key's director, fine strong ligature silk, straight needles, forceps, and scissors.

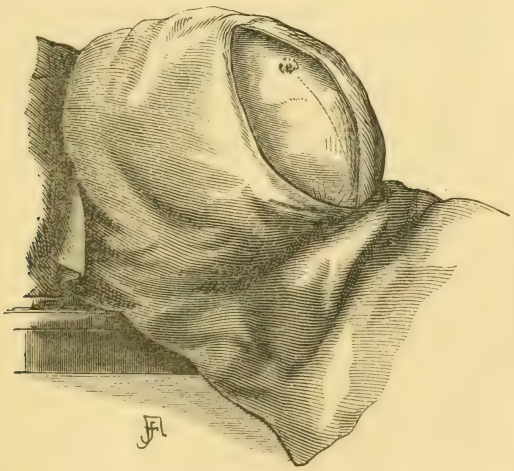
Besides a good supply of long artery spring-forceps, a few 'bull-dogs' are useful as temporary suppressors of hæmorrhage. The ordinary 'bull-dogs' are too small, and if used, should have a long piece of wire or silk attached to them as a safeguard against their accidental entry into the peritoneal cavity; but I have lately used forceps with long handles, which answer all the purposes of 'bull-dogs,' as well as of artery and torsion forceps. Mathieu's catch at the handles serves instantaneously to fix the instrument, and the short, roughened points hold a vessel very securely, stop bleeding completely, and enable the surgeon to twist the vessel if he wishes. These forceps are well made by Krohne.

CHAPTER XIII.

THE OPERATION OF OVARIOTOMY; DIVISION OF THE ABDOMINAL WALL; SITUATION AND LENGTH OF INCISION.

We shall now suppose that the instruments have all been placed where the surgeon can reach them without moving from his post; that the patient has been placed on the table, secured there by the thigh strap and the wristbands, covered by the adhesive waterproof sheet, and brought under the complete influence of the anæsthetic. The surgeon, standing on the right side of the patient, with his right hand towards the light, has one assistant on his left hand, and another facing him on the left of the patient. Nurses with sponges and the different necessary articles already enumerated, are also behind and to the left of the patient, while the administrator of the anæsthetic stands at her head. All is now ready for the first step of the operation, namely—

The incision of the abdominal wall.—We have now to consider the situation and length of the incision.



In all my cases the linea alba has been selected as the seat of incision (as here shown), and in a very large majority of the

cases on record other operators have selected the same situation. But in some few cases the incision has been intentionally carried either to the right or left of this line. One of the lineæ semilunares has been occasionally, though very rarely, selected; and in some few exceptional cases oblique or transverse incisions have been made. Thus Dr. Atlee in one successful case made an incision seventeen inches long, from the symphysis pubis to the middle of the crest of the right ilium. Bühring made an incision at the outer border of the external oblique on the right side from the false ribs to the crest of the ilium.

In one of the earliest cases in England, Mr. King made one vertical incision, seven or eight inches long, to the right of the umbilicus, and another four inches long at right angles, extending towards the spine. In this case no tumour could be found, and the patient recovered. In another case he made 'a division of about three inches through the integument and the linea semilunaris of the left side, a little above a line drawn across the abdomen from the umbilicus.'

An incision nine inches long was made by Dr. Mercier, from the 'lower ribs to external edge of rectus muscle.'

Dr. Haartmann made an incision, five inches long, parallel with Poupart's ligament; and Dr. Dorsey met a vertical incision eight inches long, by a transverse incision in the left side six inches long. These are the principal examples on record of oblique or transverse incisions. Vertical incisions to one or other side of the linea alba have been less uncommon.

Dr. McDowell, in his first and second cases, made his incisions nine inches long, three inches from and parallel to the left rectus. In his subsequent cases he seems to have selected the linea alba.

Some writers, as Hamilton, who describes his incision as 'corresponding to the inner margin of the right rectus,' merely express in other words division of the linea alba. The object is to avoid either of the recti muscles. The only operator, so far as I know, who prefers division of one of the muscles, is Dr. Storer, of Boston, who says, 'I differ from most operators in that I prefer making the section in the track of a rectus muscle rather than in the linea alba, being thus much more certain, from the nature of the tissue divided, of a primary reunion.'

As I do not believe it possible that a divided and reunited muscle, even when most complete union results, can form so firm, unyielding, and perfect a portion of the abdominal wall as the uninjured muscle in its normal state—as I do not think that division of the muscle can make union of the skin, peritoneum, or cellular tissue more certain or complete—and as I never once saw any want of union when the recti had been carefully avoided, I always endeavour to divide the linea alba accurately, without opening the sheath of either rectus.

It is not often easy to do this, for the weight of the tumour has generally either drawn the recti to one side, or the muscles have been spread out over the anterior surface of the cyst. *Anatomically*, it appears a matter of some importance not to open the sheath ; but although it is well to try to hit the linea alba exactly, it does not appear of much importance *surgically* if one edge of the muscle be exposed, or if a division be made through the muscle parallel with the course of its fibres. If the incision be extended above the umbilicus, it is better to carry it round to the left side, because the round ligament of the liver passes diagonally upwards and backwards towards the right side, and might be wounded if the incision were carried either directly through the umbilicus, or to the right side. In some cases a wound of the round ligament might not be of consequence, but in others it might lead to serious hæmorrhage, as the embryonal umbilical vein is not always entirely obliterated, but remains patent, and is sometimes of considerable size.

When the linea alba is chosen for the incision the following structures are successively divided :

1. The skin.
2. The subcutaneous areolar tissue, with fat of varying thickness.
3. The interlaced fibres of the aponeuroses of the abdominal muscles constituting the linea alba.
4. Layers of the fascia transversalis with more or less fat. The uppermost layer adheres closely to the linea alba. The deepest layer is only very loosely connected with the peritoneum.
5. The peritoneum.

But this normal arrangement is often much modified. When

there is much œdema of the abdominal wall the different layers may be widely separated, and appear as if increased in number, or they may be agglutinated together by previous inflammatory processes; and, as before mentioned, the recti muscles are often carried so much to one side by the tumour that it is almost impossible to avoid exposure or division of some of their fibres.

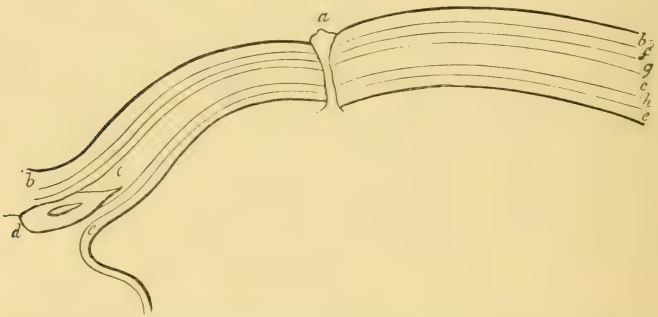
The anatomical question may, perhaps, be studied by the assistance of the accompanying diagrams, which show the structures necessarily divided if the abdominal wall be cut through—

1. Along the linea alba.
2. Through one of the recti muscles, and
3. Along one of the lineæ semilunares.

The effect of division in the upper and lower part of the linea alba is also shown.

Let diagram No. 1 represent the layers just enumerated as divided, when an incision is made through the anterior abdominal wall at the linea alba.

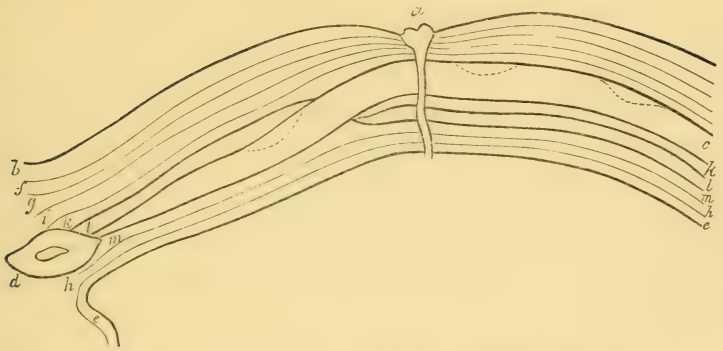
No. 1.



a. Umbilicus.
b. Skin.
c. Linea alba.
d. Symphysis.
e. Peritoneum.
f. Superficial layer of areolar tissue.
g. Deep layer of ditto.
h. Areolar tissue rich in fat, or perimysium internum.

The following diagram (No. 2) will then show how many additional layers must be divided if the incision be carried on either side of the linea alba through one of the recti muscles.

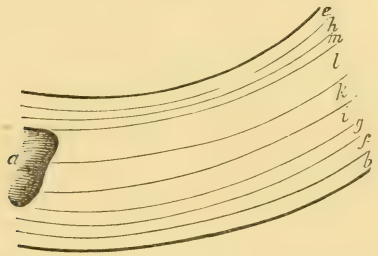
No. 2.



a. Umbilicus.
b. Skin.
c. The rectus muscle with its inscriptiones tendineæ.
d. Symphysis pubis.
e. Peritoneum.
f. Superficial layer of areolar tissue.
g. Deep layer of ditto.
h. Perimysium internum.
i. Aponeurosis of external oblique muscle.
k. Aponeurosis of internal oblique muscle.
l. Aponeurosis of transversalis muscle.
m. Fascia transversalis.

The diagram No. 3 shows the layers divided if the incision be made along one of the lineæ semilunares.

No. 3.



a. Crest of the ilium.
b. Skin.
e. Peritoneum.
f. Superficial layer of areolar tissue.
g. Fascia superficialis.
h. Perimysium internum.
i. Aponeurosis of external oblique muscle.
k. Aponeurosis of internal oblique muscle.
l. Aponeurosis of the transversalis muscle.
m. Fascia transversalis.

Each of the structures which make up the anterior abdominal wall, and are arranged in the layers represented in the above diagrams, are of some interest to the surgeon who performs ovariotomy.

1. *The integument* is thinner and more sensitive between the sternum and the umbilicus than in other regions. Around the umbilicus it is not moveable, being firmly connected with the aponeurotic ring by cellular tissue, which contains no fat. But when fluid, ovarian or ascitic, is free in the peritoneal cavity, it often passes through the ring, and distends the integuments into the semblance of an umbilical hernia. Below the umbilicus the integument is very often found œdematous, and any lineæ albicantes present then become very prominent; this condition does not seem to interfere with union of the incision by first intention.

2. *The subcutaneous areolar tissue* in some parts of the abdominal wall presents two distinct and separate layers. The superficial layer is rich in fat-cells, and contains the superficial blood-vessels. The deeper layer has more the character of a fibrous fascia, and is the proper fascia superficialis. This separation is most apparent in the hypogastric and inguinal regions, and is more easily demonstrated in old than in young persons. Of the blood-vessels which ramify in the cellular tissue, only the external epigastric artery and vein are of practical interest. The artery, or some of its larger branches, are more likely to be divided when the incision is along one of the lineæ semilunares, or through one of the recti muscles, than when the linea alba is divided. But it can be readily tied before the peritoneum is opened. The external epigastric veins are frequently enlarged or varicose when tumours obstruct the current of blood along the inferior vena cava. In some rare cases a subcutaneous vein communicates through the umbilical ring with the pervious umbilical vein. A slight deviation in the line of incision will often enable the surgeon to avoid enlarged veins; and if this cannot be done, it is advisable to stop the current of blood through the vein before it is divided, by acupressure—passing a hare-lip pin through the skin and out again, after passing under the vein. In this way, what might be otherwise a serious loss of blood is prevented.

3. *The sheaths of the recti*, complete anteriorly, incomplete posteriorly from about two inches below the umbilicus, formed by the aponeurosis of the flat abdominal muscles, and terminating in the linea alba, hardly require more than a passing mention. But if much disturbed during the first incision, abscess is very likely to delay healing.

4. *The recti and pyramidales* muscles are almost always seen, and one or other is generally divided in ovariotomy. When the recti are unusually broad near the pubes, the pyramidales may be absent. When the recti are narrow below, the pyramidales lying in front of the recti, and inclosed in the sheath, are inserted into the inner border of the sheath, half-way between the pubes and the umbilicus, or even higher.

5. The fibres of the flat abdominal muscles cross each other in different directions, embrace the recti muscles, and conjoin on the linea alba, forming a tendinous band, which is very strong at the pubic end, and broader and weaker at the sternal end. The fibres of the aponeurosis on one side continue across the linea alba, and interlace with fibres coming from the opposite side, forming meshes which in the normal state are very small, only giving passage to nerves and vessels; but which, after great distension of the abdominal wall, form apertures through which small masses of fat may escape from beneath, forming what have been called Herniæ adiposæ, and often leading an inexperienced ovariotomist to think that he has opened the peritoneal cavity, and exposed the omentum.

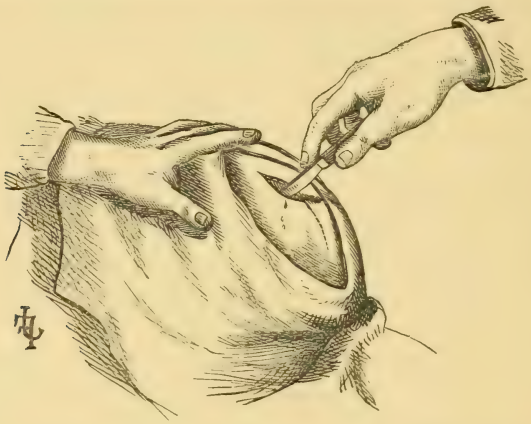
6. The *umbilicus* is merely one of these openings in the linea alba; but the occasional permeability of the embryonal umbilical vein (already referred to) must be borne in mind, and the fact that the urachus may also remain permeable, and urine escape from the bladder through it at the umbilicus. I have never seen this in the adult; but in one case of ovariotomy I found the urachus, though closed at both ends, open for the whole length of my incision in the abdominal wall, and filled by small urinary concretions. Usually it is obliterated, and forms the vesico-umbilical ligament running up along the linea alba from the bladder to the umbilicus.

7. The *deep fascia*, or the layers of areolar tissue between the inner surface of the transversalis muscle and the peritoneum, or rather between the fascia transversalis and the peritoneum, is very elastic, and only loosely adherent, so that it is easy to separate the peritoneum to a considerable extent without opening it. Indeed, if fluid be free in the peritoneal cavity, the membrane bulges up, like a bluish thin-walled cyst, as soon as the deep fascia is divided.

8. The *peritoneum*. It must be remembered that the

obliterated umbilical vessels and urachus, passing from the fundus of the bladder to the umbilicus, are enclosed in a fold of the parietal peritoneum. The inferior epigastric artery, ascending obliquely from Poupart's ligament to the posterior surface of the rectus muscle, is enclosed in a similar but less prominent fold. The fold from the umbilicus forming the suspensory ligament of the liver has been already alluded to. It is with the later steps of the operation of ovariotomy that the peritoneum and its reflections have the most important relations. In connection with the first incision it is only necessary to add that it must be useless to carry this incision nearer to the symphysis pubis than the reflection of the peritoneum from the anterior abdominal wall to the bladder; and it is a safe rule to stop short of this point, and not carry the lowest point of the incision nearer than two inches to the symphysis pubis.

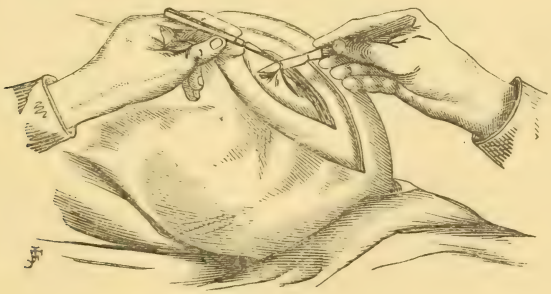
As a rule, the abdomen is tense, and the incision is made with an ordinary scalpel held in the first position, as shown in this drawing. If the operation is performed soon after tapping, and the abdominal walls are very lax, it is convenient to mark the exact line and extent of the incision intended to be made



with ink or chalk, and then, holding up a fold of integument, to transfix with rather a long bistoury, and complete the incision of the skin with one stroke of the knife. The linea alba and any fat behind the recti muscles may then be carefully divided in the usual way, until the peritoneum is reached.

If there is any fluid free in the peritoneal cavity, the peritoneum bulges into the gap made by the incision, looking very like a dark thin-walled cyst, and it has often been mistaken for a cyst; extensive separation has been made of supposed adhesions, while the operator was really stripping the peritoneum from the abdominal wall. When the peritoneum bulges as just described, it should always be opened and the fluid allowed to escape, which the waterproof apron allows to be done without wetting the patient or its running over the floor, if the sheet is so held as to direct the fluid into the foot-pan under the table. Even if the bulging membrane were not the peritoneum, but a thin-walled adherent cyst, no harm could be done by this puncture, as it is certainly a good plan to empty the cyst before separating the adhesions. When there is no fluid free in the peritoneal cavity, and an ovarian cyst is free, it is necessary to divide the peritoneum very carefully, or the cyst might be punctured and its contents discharged into the peritoneal cavity. The peritoneum should be raised with a hook or forceps, the double sharp hook of Mr. Adams answering the purpose perhaps better than any other instrument; and the

membrane is then divided by one or two horizontal touches of the knife, as shown in this drawing, and an opening made large enough to admit the insertion of a broad director. The instru-



ment known as Key's hernia director is that which I have always used. The end is rounded in imitation of a finger-nail;

the groove does not extend within half an inch of the point, and thus far greater safety from the danger of wounding overlapping intestine is attained than by the use of the ordinary narrow directors, where the groove runs quite to the end. Upon this director a blunt-pointed bistoury is passed, and the peritoneum divided to the full extent of the incision in the skin.

The following table shows the result of different lengths of incision in five hundred cases :—

Length of incision	Cases	Recoveries	Deaths	Mortality per ct.
3 inches	17	13	4	23·53
4 „	140	106	34	24·28
5 „	203	163	40	19·7
6 „	80	55	25	31·25
7 „	29	19	10	34·48
8 „	20	13	7	35
9 „	8	4	4	50
10 „	2	0	2	100
20 „	1	0	1	100
	500	373	127	25·4

If we compare the cases where the incision did not exceed six inches with the cases where this length was exceeded, the result appears considerably in favour of the shorter incision. There were—

	Cases	Recoveries	Deaths	Mortality per cent.
Not exceeding 6 inches . .	440	337	103	23·4
Exceeding 6 inches. . . .	60	36	24	40

While, however, it appears that the mortality in my practice has been considerably greater where long incisions have been made, it also appears to have been of little consequence whether an incision of three, or four, or five inches in length has been made.

This confirms an impression which I have formerly published to the effect that when an ovarian cyst or tumour can be

removed by an incision which does not extend above the umbilicus, 'the probability of success is much greater than when it becomes necessary to extend the incision much above the umbilicus.'

If we endeavour to carry on this inquiry, and examine the comparative success of what has been called 'the major operation,' or the 'long or large incision' with the 'minor operation,' or the 'small or short incision,' we are met at once by the difficulty that the practice of different operators has also differed in other important steps of the operation. A tumour has been removed entire by an incision from sternum to pubes, the pedicle has been tied by whipcord, the ends of the ligature left as a seton in the peritoneal cavity, and the wound has been united by sutures which have not brought together the whole thickness of the abdominal wall.

Another operator would remove a similar tumour after emptying it or breaking it up, through an incision of four to six inches in length below the umbilicus. The pedicle would be fixed between the edges of the wound with its secured end above the skin, and the whole thickness of the abdominal wall would be carefully brought together by sutures passing through its peritoneal coat.

It is obvious that the result in the two cases may be affected by other considerations than the length of the incision. So that a mere statistical inquiry as to the results obtained by different operators by incisions of different lengths, could be of very little value—certainly of less value than an equal number of cases by the same operator.

Historically, however, the inquiry is of interest, and may be of some importance as a guide to future progress, now that a considerable number of cases by the long and short incision may be compared in the practice of one operator.

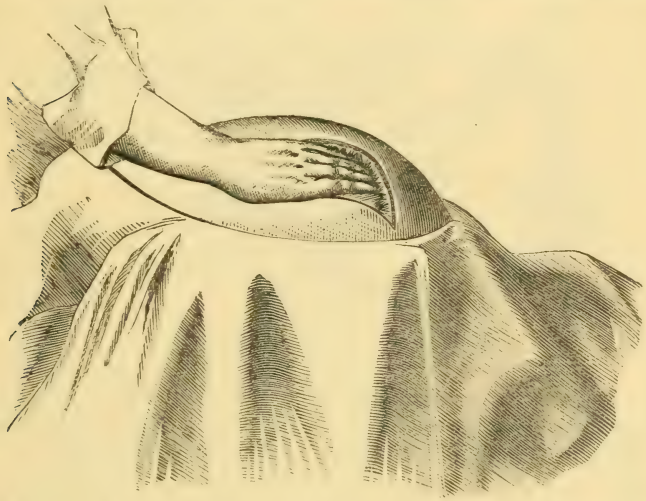
CHAPTER XIV.

EMPTYING, SEPARATION, AND REMOVAL OF THE CYST OR TUMOUR.

The smooth pearly aspect of most ovarian tumours is sufficiently characteristic for immediate recognition, and free movement of the cyst is often visible. But, when a cyst is adherent, it is often extremely difficult to find out the exact limits or boundary between cyst and peritoneum, and, rather than make any improper or dangerous separation, it is better to extend the incision upwards and downwards until some point is reached where the cyst is not adherent. From that point separation of adhesions may be commenced. When there is much fat in the abdominal wall, either in front of or behind the recti muscles, this should be divided by as clean a cut as possible, going through nearly the whole thickness of fat by one stroke of the knife, for, if the fat be much disturbed, troublesome suppuration about the wound is very likely to occur. During the progress of the incision bleeding may be tolerably free, but very often scarcely any blood is lost; and, as soon as the incision has reached the peritoneum, the wound should be carefully cleansed from the blood by soft linen or sponges. Any vessel seen to bleed should be compressed by one of the 'bull-dogs,' or catch-forceps. It is important to stop all bleeding from the wound before the peritoneum is opened. It is seldom that any large vessel is divided, but if the compression of the 'bull-dog' or torsion does not at once stop bleeding, one or more ligatures may be used, one end being brought outside. It is as well to fix this end to something conspicuous, or there would be a danger of the ligature being shut up within the peritoneal cavity.

Separation of the cyst.—I have just said that if a cyst is so closely adherent that it is difficult to ascertain its exact boundaries, it is better to empty it before attempting to separate it, than to run any risk either of separating the peritoneum from

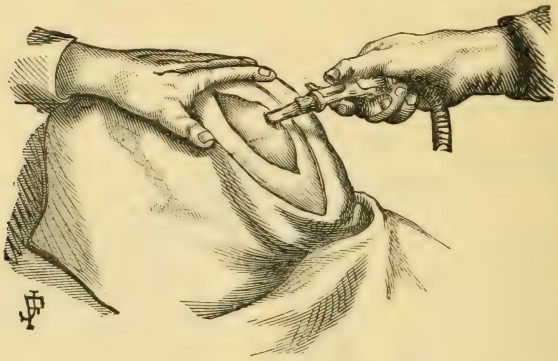
the abdominal wall, or of so rupturing the cyst that its contents might escape into the peritoneal cavity. And adhesions to the intestine or omentum, especially those at the posterior part of the cyst, are also better left until the cyst is emptied and drawn out, and the separation only completed when they can be conveniently seen. When adhesions are loose, or not extensive, and the cyst has been distinctly made out after the division of the peritoneum, the adhesions may generally be easily divided by one or two fingers, or by inserting the whole hand between the cyst and the abdominal wall—the palmar surface next the tumour, and the fingers curved to adapt the shape of the hand to the convexity of the cyst. Sometimes extensive adhesions



yield before a very slight force, but at others very considerable effort is required to break them down. Adhesions are very rarely so firm that knife or scissors become necessary to complete their separation; when this is the case, it is better to cut away some small portion of the cyst and leave it adhering to the intestine or some other viscus, than to do any damage by attempting to take away the whole of the cyst. I have never done this, as, after the cyst has been separated from the abdominal wall, emptied, and drawn out with the adhering portions of intestine and omentum, I have always been able to make complete separation, although great care has been necessary to avoid injury to the intestine. Occasionally, instead of

separating adhering omentum, it is better to divide it at some unattached point, after the application of a ligature or a temporary clamp, allowing the adhering portion to be removed with the cyst. The suppression of bleeding from separated omentum or parietal adhesions is left until after the emptying of the cyst, securing the pedicle, and cutting away the tumour.

When the tumour is found free from adhesions, or after the separation of slight adhesions, the next step is to empty the cyst. The syphon trocar with spring-hooks has been already described. This instrument, held in the right hand, should be pushed into the most prominent part of the cyst, if this appear to be

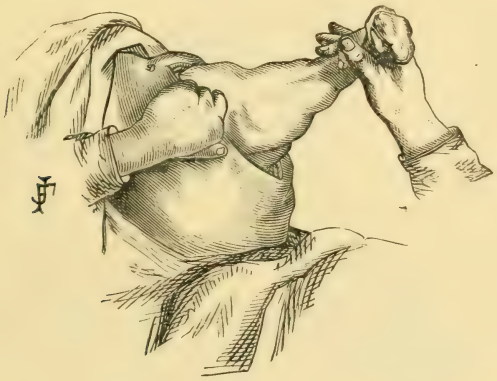


simple; if multilocular, into that chamber which is likely to contain the largest quantity of fluid, and the point is to be drawn within the canula by means of the thumb-piece.

After a portion of the fluid has been drained off, and the cyst has become more flaccid, it is drawn higher up over the canula by means of hooks or the tenaculum, and fixed between the prongs of the spring-hooks, which, if properly adjusted, will hold the cyst-wall tightly around the canula. After the first cavity has been emptied, a second, a third, and more if necessary, may be tapped successively without removing the canula from its hold, merely by pushing the trocar forward and thrusting it through the septum which separates the emptied from the adjacent full cavity. In this manner the whole tumour may be emptied of its fluid contents and its bulk so reduced that it may be drawn through the abdominal opening without undue force. In a case where there

are several cysts which cannot be tapped one through the other, they must be emptied singly, either by the same trocar or by another. Great care must be taken, if the same trocar be used, lest some remaining fluid should escape through the punctured opening into the abdominal cavity.

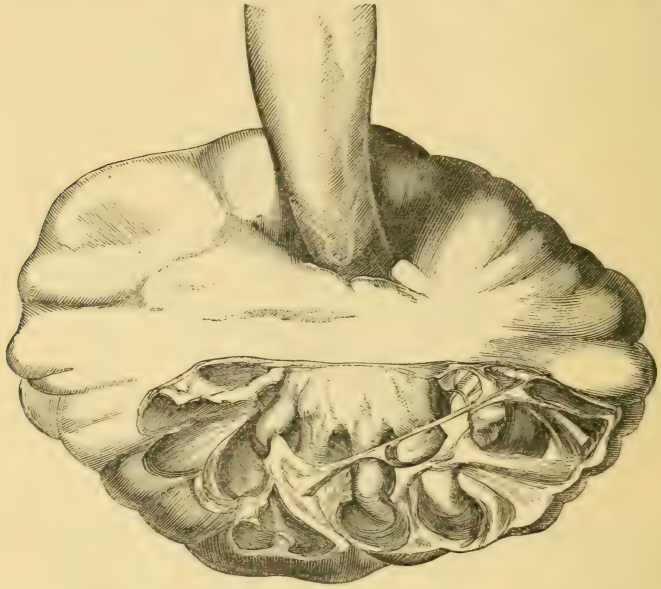
Having succeeded in reducing sufficiently the size of the tumour, the surgeon then draws it through the incision, at the same time breaking down any adhesions which have not been separated before. The assistant opposite to the operator now



places his hands on either side of the incision, and prevents the prolapse of the viscera by carefully keeping the edges of the incision in close approximation. He does this best by placing the middle finger of his right hand inside the abdomen, hooking up the abdominal wall, and then, by the thumb on one side of the opening and the forefinger on the other side, he holds the edges of the opening close together. And he should not allow his attention to be diverted from this very important part of his duty. The assistant at the operator's left hand receives the cyst in a towel or basin, and supports it until it is completely separated. No traction whatever is permitted, and the greatest precaution ought to be observed in this respect when the pedicle is short, and when there remain undivided adhesions.

In order to relieve the weight of the tumour, cysts which had not been emptied before may be punctured, and secondary cysts, if the septa are thin, may be broken down by the hand, as shown on the next page. Great care ought to be taken that nothing gravitates into the abdominal cavity.

But it will not be always possible to reduce the bulk of the tumour sufficiently to bring it through the original incision. Tumours are sometimes met with which consist of solid or semi-solid unyielding masses, or they are divided by trabeculæ into small cavities filled with viscid, colloid substance, which cannot be broken down, and will not pass through the canula. It will



therefore become necessary to enlarge the incision upwards. This is less dangerous than any attempt at squeezing a large tumour through a narrow outlet; either the cyst may burst, and its contents escape into the abdominal cavity, or the edges of the wound are so bruised that union by first intention might be prevented, or the peritoneum so injured that fatal peritonitis or gangrene may result.

I was formerly in the habit of having flannels wrung out of water at 96° carefully wrapped round the cyst as it escaped, to protect the peritoneal cavity. But I discontinued this practice, finding that it was impossible to prevent small filaments of wool separating from the flannel and adhering to the peritoneum.

CHAPTER XV.

TREATMENT OF THE PEDICLE, SPONGING OF THE PERITONEUM, AND CLOSURE OF THE WOUND.

Pedicle.—The emptied cyst, or the tumour sufficiently broken up to admit of its being drawn through the opening in the abdominal wall, having been freed from any portions of omentum or intestine adhering to it, must be carefully supported by the assistant who stands to the left of the operator, while the attachments which connect the root or base of the tumour with the side of the uterus are examined. For the sake of convenience, the attachment, whether long, narrow, and cord-like, or short, thick, and broad, may be considered under the common designation of pedicle. It consists of the Fallopian tube, often much elongated, the broad ligament often considerably thickened, the utero-ovarian ligament, occasionally hypertrophied into a large fibroid stem, and the round ligament. Sometimes the round ligament is so convoluted that a double curve of it may be included in the pedicle, but it is often quite free from it. Occasionally, the utero-ovarian ligament and the Fallopian tube are not connected by the broad ligament; a considerable space may intervene between them, so that they appear as two pedicles to one tumour. The pedicle always contains large blood vessels; occasionally, the veins are so large and distended that they resemble the intestines of a rabbit. The origin and distribution of the uterine and spermatic arteries have been described in the first chapter, and some of the venous plexuses have been shown in a drawing. Numerous lymphatics, after a devious course and many inosculations passing between the ovary, the tube, and the broad ligament to the lumbar plexus, are also enclosed in the pedicle, and nerves of considerable size accompany the vessels. I have seen a nerve quite as large as the radial in part of the pedicle left above the clamp.

Before the tumour is cut away the pedicle must be secured;

and the operator will do this in different ways, according to his intention to adopt the intra-peritoneal or the extra-peritoneal method of dealing with the pedicle, after the removal of the tumour.

The older operators, McDowell and Clay especially, adopted a plan which may be considered a combination of both methods. The pedicle was tied with silk or whipcord, the tumour cut away, and the tied pedicle was left low down in the abdominal cavity, surrounded by the ligature, while the ends of the ligature were brought out between the edges of the closed wound. Half or three-quarters of an inch of the lower angle of the wound were left unclosed to admit of the passage of the ligature thread, to keep a space for discharge, and for the removal of the ligatures and of the tissues strangulated by them as soon as separation was complete.

The intra-peritoneal method was originated, in 1821, by Dr. Nathan Smith, of Baltimore, who secured the pedicle by leather ligatures, and, after removal of the tumour, cut off the ends of the ligatures short, and left them within the peritoneal cavity, closing up the wound completely. He was followed by Dr. Rogers, of New York, who, in 1830, also cut off the ligatures 'close to the knot, and left them to absorption.' In England this method was revived by Dr. Tyler Smith, and has been followed by many operators.

The other intra-peritoneal methods include the use of the cautery, the écraseur, the twisting off of the tumour, torsion of its vessels, or the separate ligature of the vessels of the pedicle, rather than of the pedicle itself.

In adopting the extra-peritoneal method, instead of shutting up the pedicle with the ligature, or the eschar made by the cautery, within the peritoneal cavity, the pedicle and the clamp or ligature securing it are carefully fixed outside the closed wound.

The following extract from clinical remarks which I made at the 'Samaritan Hospital' in October, 1868, and which were published soon after in the 'Medical Times and Gazette,' may be taken as the expression of an opinion which subsequent experience has confirmed, as to the relative value of the extra- and intra-peritoneal methods of dealing with the pedicle.

'Since last October I have completed the operation of ovario-

tomy in this Hospital in thirty-six cases, besides one case in which I performed the operation successfully for the second time on the same patient. Of the thirty-six women, thirty-one recovered and five died. And it is a remarkable fact that in *every case* in which the pedicle was long enough to enable me to use the clamp the patient recovered. There were thirty of these cases—thirty clamp cases in one year without a single death. In two cases I used the cautery. One of the patients recovered, and one died. In four cases I tied the pedicle, and returned it into the cavity of the abdomen after cutting off the ends of the ligature. All these four patients died. Two of them must have died, I think, in whatever manner the pedicle had been treated. They were almost hopeless cases, and the operation was done as a forlorn hope. In one case the patient was sinking fast from septicæmia, a cyst filled with fœtid fluid and poisonous gas having been washed out repeatedly, but ineffectually, with carbolic acid, and it was at last removed with only the very faintest hope of saving life. In the other case, extensive pelvic adhesions and disease of both ovaries had been pretty accurately made out, and had led to repeated tappings rather than ovariotomy. But at length, when tappings became of no avail, the cysts were removed, with some slight hope but with far greater apprehension. A clamp could not be used in either case. The pedicles were too short. The cautery might have been used; but the pedicles were of the kind where the cautery is often ineffectual in stopping bleeding—broad, thin, membranous attachments, with large vessels. In such cases the ligature succeeds well in stopping bleeding; but whether the ends are left hanging out through the opening in the abdominal wall, or are cut off short and returned with the pedicle, the results in my hands have been almost equally unsatisfactory. Other operators have been much more satisfied with the ligature than I have been, and everyone must be guided very much by his own experience. But when I look back over the work of the past year in this Hospital, where all the patients have been treated in all other circumstances under similar conditions, and find no single death in thirty clamp cases, but every one a recovery, while of six cases treated otherwise five die, you will hardly wonder that I use the clamp whenever I can, especially as very similar results have been obtained in private practice.

It is true, as I have just said, that two of these five deaths would probably have happened even if I had been able to use a clamp. But three of the deaths I attribute principally, or entirely, to the fact that, as I was unable to secure the pedicle outside the peritoneal cavity, I was driven against my will to the cautery or the ligature. Twice I used the cautery. In one case it stopped all bleeding, and the patient recovered. In another it only stopped the smaller vessels, the larger having to be tied, and this patient died; so that her death might be added to that of the four who died after the return of the tied pedicle. Or if, as I think it is fair to do, we put aside (so far as the treatment of the pedicle is concerned) the two cases which probably must have died however the pedicle had been treated, we have three cases where death followed the use of the ligature; and, so far as I can judge from observation of similar cases, these three patients would probably have recovered if the pedicles had been long enough for a clamp to have been applied and fixed outside the peritoneal cavity.'

The question, what becomes of a ligature, and of the tissues strangulated by it, when closed up in the peritoneal cavity, is a very important one. It is quite certain that the changes differ very widely from those which follow the use of the ligature when the ends are left to pass out through the partially closed wound. In this case they lead to free discharge of serum or pus, until the separation of the ligature and the slough. Whatever may be the material of the ligature, the tissues strangulated by it come away after a longer or shorter process of suppuration; and if anything like what goes on outside the body when one of the extra-peritoneal methods is adopted, or when the wound is left open for the ligatures, went on when the wound is closed, no patient could possibly survive the process. She would almost certainly be poisoned by absorption of the fœtid products of the decomposing stump. A very different series of changes must go on when the wound is closed and access of air shut off. Experience shows that many patients do survive the process; and examination of those who have died has shown that a pedicle secured by a silk ligature has been found some days afterwards, either first, surrounded by coils of adhering intestine; second, as the centre of a purulent cavity; third, very little altered, with the ligature deeply imbedded within it; and fourth,

completely dead or gangrenous. All these different conditions I have actually seen accompanied by more or less evidence of peritonitis, and depending more, I believe, on the general health of the patient and the conditions in which she was placed, than upon any difference in the material of the ligature or the mode of its application.

Our knowledge of this subject has been greatly increased by the report of the experiments of Spiegelberg and Waldeyer, published, in 1868, in Virchow's 'Archives.' Their experiments were arranged in two series:—1. Excision of portions of the horns of the uterus of bitches, leaving the ligatures in the peritoneal cavity; and 2. Removal of portions of the uterus by the galvanic cautery. The conclusions of the experimenters are that small foreign bodies may be left in the peritoneal cavity without danger, and that strangulated and cauterised tissues do not become gangrenous and are not injurious to neighbouring parts, provided only that the abdominal cavity is perfectly closed.

We may ask how far the experiments bear out the conclusions; and first as to the changes which foreign bodies themselves undergo when left in the peritoneal cavity.

Ligatures, either of silk or hemp, up to about the twenty-first day, scarcely show any change, except some softening of the hemp. 'Between the particular fibres which compose the ligature thread, a number of young cells insinuate themselves, separating the threads from each other in some places in a remarkable manner, and evidently penetrating from neighbouring parts. After a longer time, the fibres are in this manner completely separated from each other, the knots loosened, the threads totally unravelled. Where a ligature had cut through, in several cases its track was marked by the remnants of single fibres.'

Then, as to the changes produced by the ligature in and about the parts where it is applied. The Breslau Professors found the ligatures either '(1) closely encapsuled by newly-formed cellular tissue; or (2) free in the peritoneal cavity, having slipped off from the tied parts; or (3) free as if swimming in a small cystic cavity of the stump.' I translate the word *Schnürstücke*, or the end of the pedicle between the spot where it has been divided and the spot where the ligature is applied,

as *stump*, because, for want of a better term, we say 'the stump of a pedicle,' when we wish to describe that part of it which is surrounded by a ligature or enclosed between the blades of a clamp.

These authors also use two other words—*mesometrium* and *mesovarium*. The former implies what we term the *broad ligament*.

Among the observations on the capsulation of ligatures, we find an account of an interesting case where a ligature had surrounded the body of the uterus, which was cut away nearly an inch beyond; and on the twenty-eighth day the ligature was found sunk into the substance of the uterus, which it had not entirely cut through. The fibres of the ligature were surrounded on all sides by new granulations, and there was not a trace of mortified tissue elements to be found either within or around the ring of the thread. In another case, where ligatures were applied to the uterus before cauterisation, microscopic examination fourteen days afterwards showed one of the ligatures closely surrounded by granulating tissue, the cells of which lay in great numbers between the fibres of the silk. Not a particle of mortified tissue could be found anywhere. 'Ligatures or vessels are found after four weeks enclosed in perfectly developed connective tissue. Looking on the mesometrium, small smooth nodules were observed, corresponding in size to the ligatures; but no difference could be found anywhere in the smoothness of the serous membrane covering the knots and that in the neighbourhood. It appeared as if the character of the serous membrane upon the outer surface of the connective tissue enclosing the knots had been completely re-established, and the knots had been simply imbedded between the two layers of the mesometrium.'

In one case, where a ligature had completely slipped off from the part which it had surrounded, and had been free in the peritoneal cavity, it had become firmly connected with a neighbouring coil of intestine by means of young cells springing up from the serous membrane which had penetrated between the fibres of the thread, so that there was almost an organic union between the surface of the intestine and the knot of the ligature.

Where a ligature had to cut through a thick substance—as

the body of the uterus or one of its horns—the track of the ligature could be distinctly seen on section, with help from a strong lens, as a fine gray line. It began as a slight indentation of the peritoneal coat corresponding to the place where the ligature first caught. As early as the fifth day, this indentation had become so shallow as to be in no proportion to the deeply-grooved ring round the tissues powerfully constricted by the ligature. Under a higher magnifying power the delicate line is seen to be formed by a streak of new cells, which mark the track of the ligature; but no trace can be seen of mortified particles of tissue. 'It appears, therefore, that a ligature divides tissues in a very gentle manner, as if the tissue elements became loosened and separated before it, while new cells are formed, and the gap behind it closes, so that the divided surface is scarcely ever exposed, at least within the peritoneal cavity. The first occurrence after the application of a ligature is evidently the union of the two borders of the ring cut by the ligature. In this way the thread is soon shut off from communication with surrounding parts, and then lies completely shut up in a circular canal. We have seen this very clearly in two post-mortem examinations made three days after ovariotomy. There were already abundant groups of new tissue sprouting up from the neighbourhood over the ligatures, which had cut deeply into the pedicle, and almost completely covering it. In the new granulation tissue numerous blood-vessels can be discovered very early, so that the transition to permanent tissue is very soon effected.'

The authors conclude from their experiments that ligatures enclosed in the peritoneal cavity do not lead to any evidence of acute local peritonitis, and, so far as the tissues of the uterus and mesometrium are concerned, can hardly be regarded as foreign bodies. They nowhere induce processes of mortification in these tissues; but, on the contrary, are enclosed and encapsuled on every side by them—in dogs as soon as the eighth day.

We now come to some very interesting observations, well worthy of careful consideration, upon the changes in the surface of the divided parts of the uterus. After a few days —from four to six—no free divided surface could be seen. Surrounding portions of the mesometrium, bladder, or coils of

intestine rapidly adhered to it. In one case, after nine days, numerous blood-vessels were observed running between the coats of the bladder and the uterus. In another case, after twenty-one days, the spot from whence an ovary had been removed could not be detected, so perfectly smooth and free from any cicatrix was the posterior abdominal wall where the ovary had been. In another case, six days after operation, the cut end of the left horn of the uterus was found soldered between two coils of intestine. The mesometrium was drawn in between them and united with their coats and mesentery. The divided horn of the uterus itself was also partly adherent to the intestine.

The most complete and extensive adhesions of the uterus were always with its own mesometrium. This was always observed, even when other organs were also adherent. The cut surface of the uterus falls upon the neighbouring mesometrium; new cells spring up from the latter and unite with the granulations from the uterine surface. Afterwards, retraction of the new-formed granulation tissue draws the stump of the uterus more and more within the folds of the mesometrium, until it is completely surrounded. A very free vascular communication has been observed between their united surfaces. The authors never observed any divided surface either free or with shreds of gangrenous tissue about it.

Similar conditions were observed in the two ovariotomy cases just alluded to. The divided surfaces of both pedicles were on the third day perfectly fresh, without any gangrenous appearance. In the first case, where both ovaries were removed, both pedicles were free and directed upwards; in the second case, the divided surface of the pedicle was in contact with the peritoneal covering of the psoas magnus, with which it was connected by new cells, and without any trace of gangrene.

Passing on to the consideration of the effects produced by the ligature on the part enclosed by it—the stump—the authors say that when a blood-vessel is tied, the strangulated end of the vessel dies and is thrown off with the ligature. Hence the rule not to tie a vessel far from its cut end, but as near as it can be done with certainty to stop bleeding. So that when it was proposed to tie a pedicle of an ovarian tumour and leave ligature and stump in the peritoneal cavity, it was feared that

there would be great danger from the death of the strangulated stump. At the same time, if the stump were left very short, by cutting away the tumour close to the ligature, it was feared that the ligature might slip off, and internal bleeding take place. The authors consider that their experiments prove these fears to be exaggerated—at least they establish the fact that in dogs there is no gangrenous change in the stump, nor any trace of mortification either on the divided surfaces or on the parts behind the ligature. In the case where the divided end of the uterus adhered between two coils of intestine, the stump had contracted to a nodule hardly as large as a pea, consisting of a part of the uterine wall with its mucous membrane everted, and containing all its structural elements, including the utricular glands, completely unaltered. The openings of these glands had thus been brought free in the peritoneal cavity.

Larger stumps were enveloped in folds of the mesometrium. Their canals were almost always pervious, and in some had become dilated into a sort of cyst with muco-purulent contents. Sometimes the ligature-knots lay within these cysts, the textures of the walls remaining almost unaltered, and the mucus- and pus-corpuscles showing very little retrograde metamorphosis. In most cases there remained a narrow communicating opening between the cavity in the stump and the rest of the uterus. In two cases the cavity of the stump was obliterated and filled with young granulation tissue, in which no epithelium of the uterine cavity could be found, although there were remnants of utricular glands. All this proves that the textural alterations take place by simple retrograde metamorphosis, fatty degeneration, and gradual absorption, with a formation of cells which become permanently organised tissue, but without the occurrence of any violent inflammatory or gangrenous changes.

The authors have not much to say about the changes in the surfaces cauterised. Only three animals were subjected to experiment, and these were killed on the sixth, fourteenth, and twenty-sixth days after the application of the cautery. On the sixth day the cauterised surface of the central part of the uterus appeared quite fresh, beset with numerous small brown-black particles of animal charcoal, not softened, but

firm and hard. At a depth of two or three millimètres, the uterine tissue was coloured reddish, as if from imbibition of the colouring matter of blood. The uterine cavity was shut off from the peritoneal cavity, but rather by the firm agglutination of the tissues of the cauterised surface than by granulations, none of which could yet be seen. The microscope showed the tissue of the cauterised part to be unaltered, the vessels dilated, and many of them filled with clot. The colouring appeared to be due to blood-corpuscles and diffused colouring matter of the blood. All these changes, however, were circumscribed, and might easily have gone on to complete restoration. Much more extensive alterations were found on the two cauterised surfaces of the uterine horns. These were so completely surrounded by folds of the mesometrium that they could not be seen until these folds had been dissected off. At only one spot of the left horn near the cauterised surface, an opening was found as large as a pin's head, which opened into the dilated cavity of the horn. About two centimètres distant from the cauterised surface, the mucous membrane and the muscular tissue of the uterus were softened and gangrenous. Shreds of mucous membrane lay in the cavity, the walls of which were formed merely by serous membrane and the adherent mesometrium. The vessels, even to the smallest, were completely blocked up by clot. The gangrenous process about the cauterised parts appeared to be due to the extension of clot in the vessels; but all was encapsuled by the mesometrium. No pus was found in the peritoneal cavity, not even near the small opening which communicated with the uterine cavity. A successful result might therefore have been expected. It was obtained in the two following cases.

After fourteen days the cauterised surfaces of the central extremity of the uterus, as well as those of both horns, were all completely encapsuled by mesometrial folds. The central extremity of the uterus was firmly united to the posterior wall of the bladder by perfectly organised connective tissue. The cauterised surface of the right horn was firmly united to a coil of small intestine.

On the twenty-second day repair was found to be complete. The cauterised surface of the body of the uterus was bound to the posterior wall of the bladder by a fibrous

band. The cauterised surface of the mesometrium was everywhere smooth; nothing could be seen to show that a piece of it had been separated by the cautery from the horns of the uterus. The cauterised spots on the uterus were smoothly encapsuled, and the only traces of the cautery were minute remnants of animal charcoal. These fragments of charcoal lay in a firm fibrillated connective tissue which closed the uterine cavity. The epithelium of the uterus and the other elements of the uterine wall were perfectly preserved.

I am indebted to Dr. Maslowsky, of St. Petersburg, for two papers which he kindly sent me, one from the ninth volume of Langenbeck's 'Archiv,' and the other from the 'Berliner Klinische Wochenschrift,' which contain observations corroborative of those by Spiegelberg and Waldeyer. In one successful case Dr. Maslowsky removed both ovaries, treating the right pedicle by the cautery and the left by ligature, returning both into the peritoneal cavity. And he made twelve experiments on rabbits, dogs, and cats, removing the horns of the uterus and the omentum, sometimes by the galvanic cautery and sometimes by redhot irons, in order to study the process of capsulation of the eschar after its enclosure within the peritoneal cavity, and the share which the white blood-corpuscles have in this process. As these corpuscles take up vermilion from the blood, Dr. Maslowsky injected vermilion into the jugular vein at different periods after his experiments, in order to trace the corpuscles in any product of inflammation.

Microscopic examination of the animals at different periods, from fifteen hours to seventy days after operation, proved that the eschar on the uterine horns and on the omentum is first covered by effused fibrine, and is afterwards united by membrane with surrounding organs. 'The fibrinous exudation contains many round cells charged with vermilion, and some nucleoli free from vermilion. It soon loses its fine fibrillar structure, and is changed into a finely granular mass. The round cells with vermilion assume an oval form, and then spindle-shaped cells are also seen without vermilion. Some cells contain black nucleoli not composed of vermilion; afterwards these may be seen between the fibres. As the capsulation is completed, the oval cells which contain vermilion become long and then spindle-shaped. And I have

sometimes observed that the ends of two spindle-shaped cells coalesce, and at once form a fibre. In the new-formed membrane, capillaries are seen as soon as the fourth or fifth day, and on the tenth or twelfth the vessels may be easily injected. I have also seen in the membrane newly formed elastic fibres and scaly epithelium, both free from vermilion. The false membranes have a similar structure. It is therefore an undeniable fact, that the white blood-corpuscles participate in the formation of the new membrane which covers the eschar, and unites it with surrounding organs.'

The eschar made by the galvanic cautery consists of animal charcoal and blood pigment. The particles of animal charcoal are partly lying in the eschar, and are partly enclosed in surrounding connective tissue. When red-hot iron is used, the eschar also contains particles of oxide of iron, some of which are also found enclosed by the elements of connective tissue. It is proved that the black specks are really iron by the ordinary chemical reactions. The mucous membrane of the uterus near the cauterised part was suppurating, and the pus-corpuscles contained vermilion.

Dr. Maslowsky also made a number of observations on the mesentery and mesometrium of frogs and rabbits, in order to ascertain the precise changes which the vessels themselves, and the blood circulating in them, undergo after the application of the cautery. From twelve to twenty-four hours before examination vermilion was injected into the jugular vein. The frogs were immobilised by woorara, the rabbits narcotised by opium. The results of the microscopical observations are as follows :—

'*a*. The end of closed arteries is contracted immediately at the cauterised part, but at some distance from it the artery is dilated. The canal of the veins is affected exactly in the reverse manner.

'*b*. The blood in the vessels contains black particles from the heated iron, and separates itself distinctly into a layer of white blood-corpuscles, which are near the cauterised spot, and a layer of red blood-corpuscles, which are further away.

'*c*. In the closed arteries after two days the movement of the column of blood is maintained. A part of the blood, with the black particles of the cauterised artery mixed in it, reaches back towards the trunk of the vessel. The movement of the

blood in cauterised veins is only kept up for a very short time. There is complete stagnation, not only in the cauterised vein itself, but it extends further up to the junction with larger veins.

'*d.* The black particles are taken up by the white blood-corpuscles. This can be seen most distinctly in the vessels where stagnation of the blood is not complete.

'*e.* The migration of white blood-corpuscles, partly containing vermilion and partly black particles, begins twenty, thirty, or sixty minutes after cauterisation. They are first seen in the veins into which the cauterised vein opens; afterwards in the veins near the cauterised part. Very few white corpuscles migrate from the arteries. In frogs, as the mesentery is very broad and transparent, this migration can be observed for three days; in rabbits only for six or eight hours.

'Similar changes in the vessels and migration of white blood-corpuscles I have also observed after ligature of mesenteric vessels, and after burning away part of the tongue in the frog. When entire portions of mesentery are burnt away, the same alterations occur, but to a much greater distance.

'A hot iron, shaped like a bird's bill, so as to enter for some distance into a vessel, was used in three cases, and I observed a migration of white blood-corpuscles, charged with black particles, which chemical reaction proved to consist of oxide of iron.

'It is therefore certain that particles of iron from the iron cautery may be transmitted with the white blood-corpuscles into different tissues.'

The value of these observations is unquestionable; but I cannot feel encouraged by them to look upon either the cautery or the ligature, or any intra-peritoneal method of dealing with the pedicle of an ovarian tumour, as equal, far less as superior, to the clamp, or to any other extra-peritoneal method. And the more I see of ovariotomy, and the more I am driven by the peculiarities of any case, or encouraged by the reported successes of others, or guided by the desire to avoid certain obvious and unavoidable disadvantages of extra-peritoneal methods of dealing with the pedicle, to resort to cautery or ligature—the less am I satisfied with the results of those methods, the more reluctant am I to employ them, and the greater is my confi-

dence in the clamp and the principle of the extra-peritoneal method.

In some respects the experiments are satisfactory, as they tell us what really does take place when a ligature or an eschar is shut up in the peritoneal cavity; and they teach us that, when we meet with any extraordinary difficulty in endeavouring to secure a pedicle outside the peritoneal cavity, we may resort to the cautery or the ligature, not, as hitherto, in nearly complete ignorance as to what we may expect afterwards, but with a pretty accurate idea of the process of repair and of the dangers which may attend this process. If we could hope in diseased women for the same series of changes as have been observed in healthy dogs and rabbits, we might agree more completely with the conclusions of the German experimenters. But it is one thing to remove a piece of a uterine horn, or a healthy ovary, or a bit of omentum or mesentery, from a dog or a rabbit, and a very different thing to remove a large uterine or ovarian tumour from a woman whose general health has been more or less affected by the growth of the tumour, probably by repeated tappings, and the conditions of whose pelvis and abdomen have been greatly altered by the presence of the tumour or the adhesions which it has formed with surrounding parts. Even in healthy dogs and rabbits where the ligature or the cautery was considered in the above experiments to have been most successful, we have seen that adhesion of the tied or cauterised part to the bladder, to intestine, and to neighbouring folds of peritoneum, has been the rule, and I have placed upon record cases where adhesion of the tied or cauterised pedicle to intestines has led to fatal strangulation. Even if not *fatal*, such adhesions are more likely to be permanently *injurious* than the mere adhesion of a pedicle to the abdominal wall.

Those who exclusively follow the intra-peritoneal method, and either use the cautery or return the ligature and close the wound, appear to have been influenced by objections to the extra-peritoneal method which seem to me to be either groundless or trivial. When the pedicle is held outside the wound by a clamp or in any other way, the pull upon the uterus or broad ligament is said to be very painful; but I have seen a good deal of pull with very little pain, and much more

severe pain in cases where the ligature was used than I ever saw in clamp cases. So with sickness: I have seen as much or more after the ligature or cautery, as I ever saw after the clamp. It is said to set up fœtid discharge and poison the wound or the patient; and so it does if proper care be not taken. But if the strangulated part of the pedicle which projects beyond the clamp be well saturated with perchloride of iron, the slough is tanned; it becomes as hard and dry as a piece of leather, and there is an end to that objection. It is said to cause suppuration about the wound; but this, again, I have seen quite as frequently, in proportion, after the ligature or cautery. I never saw more profuse suppuration of the stitches than in one case where I divided the pedicle with the *écraseur*, and closed the wound with platinum wire sutures. Then, after the wound is closed, it is said to lead to a re-opening each month, and an escape of some menstrual fluid. And this is true in some—perhaps in nearly a third—of the cases. But if the patient be prepared for it, it is not of the slightest consequence. The Fallopian tube contracts completely after a few months, and there is no further escape. The fact that it does escape sometimes is to my mind an argument in favour of the clamp; for if menstrual fluid can escape through the partially-closed Fallopian tube fixed in the cicatrised wound, so it may escape if the tube be left within the peritoneal cavity, and the result may be a fatal hæmatocele. I have known this to occur in cases where the ligature was used and cut off short; and I believe it to be one of the strongest objections to this method, or to any intra-peritoneal method of dealing with the pedicle. As to any fancied impediment to the increase of the uterus in pregnancy, and to its contraction during labour, from the adhesion of the tube to the cicatrix, cases will be found, when we come to consider the subsequent history of patients who have had children after ovariotomy, amply proving that, neither during pregnancy nor labour, has any suffering or difficulty been attributed by them to any such consequences of the use of the clamp. Many women have had one child, some two, some three, and two four children; and in no case has any unusual suffering been referred to the adhesion of the pedicle to the abdominal wall. One *real* objection to the clamp is that it may possibly pull on intestine, or a tense

pedicle may strangulate intestine (and I have seen one such case). But this objection is of little weight if the use of the clamp be restricted to cases where the pedicle is so long that there is not much drag on the clamp. In such cases I desire no better method. Where, however, we have a broad, thick, short pedicle, or a broad connection between uterus and cyst rather than a distinct pedicle, we want something different from the clamp. And we have the choice between one or other of the intra-peritoneal methods.

But no surgeon who has had much experience of ovariotomy would bind himself to adopt in all cases either the extra-peritoneal or the intra-peritoneal method, or any of the modifications by which either principle is carried out in practice. Every surgeon should go to an operation prepared to carry out the particular method which appears to be best adapted to the peculiar circumstances of the case which present themselves as he proceeds. If the pedicle be small enough to be securely held in a clamp of moderate size, and long enough to permit the clamp being fixed outside the closed wound, without much pull on the uterus or broad ligament, no more ready or more successful method than the clamp can be desired. When the pedicle is so short, broad, or thick that a very large clamp would be necessary to secure it, that the wound could not be closed around it, and the traction upon the uterus when the clamp was fixed outside the abdominal wall excessive, either the ligature or the cautery should be preferred to the clamp. Or if, after applying a clamp, it is found that it cannot be fixed outside without undue strain upon the uterus, either the cautery may be used, or the pedicle may be transfixed and tied, and the clamp removed after it has served its temporary purpose. In this way it often proves useful, allowing the tumour to be removed safely, and the pedicle examined more conveniently than when it is covered by a large tumour. A long piece of strong whipcord may sometimes be used with this object, but it is much more likely to slip than a clamp.

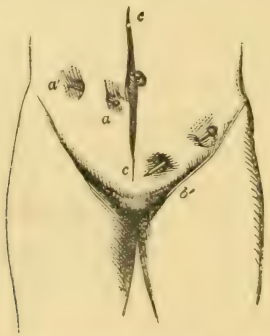
In applying a ligature to the pedicle of an ovarian tumour, unless this be very long and slender, it is never safe to trust to a ligature which does not transfix the pedicle. Many cases are on record where, after cutting away the tumour, a simple ligature has slipped off, and dangerous or fatal bleeding has followed.

It should be a rule, therefore, always to transfix a pedicle, and, according to its size, to tie it in two or more portions, before the cyst is cut away. Supposing a clamp to have been first applied, the cyst cut away, and the pedicle then transfixed and tied below the clamp, the clamp must be loosened before the ligatures are tightened. If this is not done, the knot cannot be tied so tight as to be secure after the clamp is removed; as the clamp is taken off, the tissues compressed by it retract, and are apt to slip from under the ligature. This can only be avoided by tightening the ligatures simultaneously with the loosening of the clamp.

If it be desired only to tie the vessels, it may be done by feeling the arteries, and carrying a ligature round them through the pedicle before the cyst is cut away; or, after the application of a clamp and removal of the cyst, holding the pedicle carefully with forceps as the clamp is loosened, and tying any vessel which bleeds. The great objection to this plan is, that there is often much loose cellular tissue, rich in small veins, which go on oozing after all the larger vessels have been tied. Whichever may be the plan preferred, the important question arises, Shall the ends of the ligatures be cut off, and the wound closed? or shall they be left hanging out through a part of the wound, purposely left open for their passage, and that of the slough they embrace when it separates? Dr. Clay, of Manchester, still advocates this latter practice. In its favour, it may be said, that it is a method applicable in all cases; that it secures an outlet for serum from the peritoneal cavity; and that, after the separation of the ligature and slough, no foreign body is left within the patient. But it seems to me better to have a choice of methods, and adopt each in its appropriate case, than to strive after one method applicable to all cases. I think the ligature-threads act as a sort of seton in the peritoneal cavity, set up inflammation, and excite the formation of the serum for which they are said to provide the outlet. Having tried both methods, the results would lead me to cut off the ends whenever the patient is in pretty good condition, and sthenic peritonitis with effusion of lymph may be expected; but if low diffuse peritonitis and effusion of serum may be feared, then I suspect it would be better to leave the ends of the ligature outside, and secure a drain through the wound

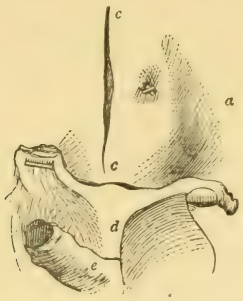
for the serum and the separated slough from the pedicle. I have treated cases successfully in this manner, but the results have not been so generally satisfactory as to induce me to use it, unless compelled to do so by the circumstances of the case. And this method is open to the objection that even if the patient recover, there is a great liability to ventral hernia. The cicatrix remains weak at the spot where the ligatures passed out, and it yields before the pressure outwards of the viscera. I have seen this in nearly every case where I followed this plan; but I remember comparatively few cases where it followed the clamp. Therefore, if we use one or more ligatures, I am inclined to cut off the ends short, and close up the wound completely. Wire has been used for this purpose; but it seems an irrational practice. Silk, if pure, is an animal substance; and experiment proves that it may be absorbed. Wire cannot be absorbed, and must be more or less of a mechanical irritant. I tried wire on one side and silk on the other side of a sheep on which Professor Gamgee operated for me at the Albert Veterinary College, and the superiority of the silk was manifest. What we have to look to is the effect on the tissues strangulated, rather than the material by which the strangulation is effected.

Acupressure was once applied successfully by Sir James Simpson. He secured the pedicle by passing a long needle through the abdominal wall, across the pedicle, and out again. The pedicle was thus compressed by the needle, as here shown,



on the outside of the abdominal wall. The head and point of the needle are seen on the surface of the abdomen, compressing the pedicle in the left iliac region. Another pin, to the right

of the incision, is supposed to compress vessels opened during the separation of adhesions. The next cut is a diagram of an



impossible view of the inner surface of the abdominal wall, with one acupressure needle crossing a wounded vessel near the incision, while a larger needle, at *b*, passes across the pedicle of the ovarian tumour which has been removed. The uterus is shown at *d*, and the rectum at *e*.

Sir Wm. Fergusson once tried this plan, but was obliged to resort to the ligature. I have never tried it myself, though I have more than once found acupressure useful in stopping bleeding from vessels torn in separating adhesions.

Écraseur.—The *écraseur* has been used for the compression and crushing of the pedicle and the final separation of the tumour; after which the pedicle is dropped into the abdominal cavity and the wound closed. Grave objections, however, against this practice are the possibility of internal hæmorrhage and its accompanying dangers, and the difficulty of finding and securing the bleeding pedicle in the depth of the abdominal cavity after having re-opened the wound. This would be especially difficult if hæmorrhage occurred after some lapse of time. I once used the écraseur and successfully; but I have not ventured on it again, for fear that it might prove untrustworthy and dangerous internal bleeding occur. This danger might be prevented by tying a strong ligature below the écraseur chain, before separating the cyst and dropping the pedicle into the abdominal cavity. But then it would be only a modification of the former methods of ligatures, and open to the same objections.

The *cautery* alone would almost certainly fail to stop such large vessels as are frequently met with in a pedicle. So might

the écraseur alone, or the crushing which precedes the division by the écraseur. But *the combination of crushing and the cautery* is certainly efficacious in a considerable proportion of cases. Mr. Clay, of Birmingham, introduced the practice and carried it out by his adhesion clamp and hot irons, both for dividing adhesions and omentum. The practice has been extended to the pedicle, and it is claimed for it that in most cases it effectually stops hæmorrhage during the operation and prevents it afterwards, that it leaves only a very thin layer of burnt tissue at the end, and is followed only by the changes which have been described in a former page. This method is of most value in cases when the pedicle is broad, thick, and short; it does not answer well when large vessels ramify in a thin membranous pedicle. Notwithstanding these great advantages, which deservedly recommend the cautery, its use is sometimes attended by serious drawbacks. Vessels not unfrequently bleed on opening the blades of the clamp, and a repetition of the whole tedious proceeding, or the use of ligatures, is necessary before the pedicle can be returned into the abdomen with safety.

The instrument used for securing and compressing the pedicle is Mr. Clay's (of Birmingham) adhesion clamp, modified by Mr. B. Brown, Mr. Harper, and by me. Having adjusted the clamp and tightly compressed the pedicle between its blades, which are kept closed by means of a screw, the tumour is cut off a short distance above the clamp. The projecting portion of the pedicle is dried, and held with a forceps during the application of the cautery. In order to protect the surrounding parts from the hot iron, towels or flannel, placed between the clamp and the abdomen, were first employed; but they often prove insufficient. I have used two shields made of talc (neutral silicate of alumina, a perfect non-conductor of heat), which, when placed around the pedicle, will protect the skin and any part likely to be injured. The cautery-irons, which are wedge-shaped with a blunt edge, should be heated to a dull red heat, and pressed slowly and firmly across the protruding portion of the pedicle, until this is burnt off clean down to the surface of the clamp, as shown in the drawing on page 340 before the tumour has been cut away. This done, the blades are cautiously opened, the operator and his assist-

ants being prepared to seize the pedicle, and prevent it from slipping into the abdominal cavity, in case any bleeding should occur. Having convinced himself that there is no bleeding, the operator gently disengages the pedicle from the blade, and allows it to drop into the abdominal cavity.

Dr. Maslowsky uses a long pair of forceps which compress the pedicle at only a few points, yet hold it securely—and these are applied before the clamp is removed. Then if any vessel bleeds, it can be touched by a pointed cautery. The late Dr. Wright devised an ingenious clamp, by which, before opening the blades, a succession of steel bars can be lifted by means of screws, and the pedicle thus partially exposed, in order to discover and to secure any bleeding vessel without disengaging the whole pedicle from the grasp of the clamp after the application of the cautery. Mr. Clover introduced a very useful cautery of pure silver, heated by burning spirit.

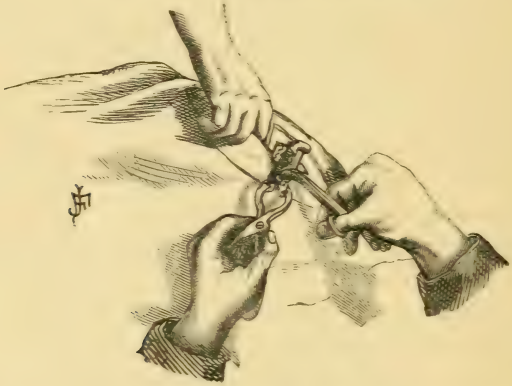
By far the safest, and most simple, and successful treatment of the pedicle is that by means of the *clamp*. None of the objections raised against the other methods can be applied to the clamp. It effectually arrests hæmorrhage, secures the end of the pedicle outside the wound, and keeps it continually under the observation and control of the surgeon. But in cases where the pedicle is very short, so that an undue, painful, and dangerous traction on the uterus or broad ligament would be caused by keeping the end of the pedicle with the clamp outside, or when the pedicle is so broad or thick that a clamp of moderate size would prove insufficient, one of the other methods just described should be preferred.

When enumerating the instruments used in ovariotomy, the earliest clamp used by Mr. Hutchinson, and a number of other forms of clamp, have been described.

The next drawing, by Dr. Junker, was made when he was watching me actually applying the form of clamp which I now use. The tumour was held up by one of the assistants, the clamp passed round the pedicle, and my right hand is shown pressing the blades of the clamp together by the forceps. This compression should be very firm, and the forceps should be held, while the screw which fixes the clamp is tightened by the left hand. After the tumour has been cut away, it is sometimes necessary to tighten the clamp still further, or to tighten the screw. The

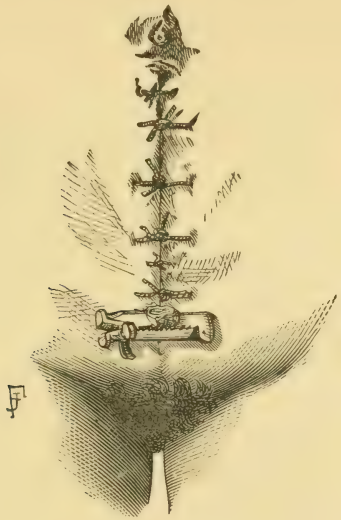
assistant keeps the abdominal wall closed around the pedicle, as shown in the second drawing on this page, also from the life;

while the surgeon, holding the clamp-forceps with his left hand, fastens the screw with his right, assisted by the needle holder.



It would seem unnecessary to add that the surgeon should be extremely careful not to enclose anything but the pedicle in the clamp, but the fact that cases are on record where a portion of the bladder has been squeezed, and where one ureter has been strangulated, and that I have myself seen a strip of omentum several times, and a coil of intestine once, very narrowly escape constriction, shows that the caution is not uncalled for.

After the tumour has been cut away and the screw securely tightened, the edges of the wound are held in contact round the



pedicle, which, with the clamp, should be brought as near to the lower end of the incision as can be done without traction, and the edges of the wound are brought in contact around it as shown in the above drawing.

Any superfluous portion of the pedicle protruding beyond the clamp is cut off, but not quite close to the clamp, for this would lead to the danger of the pedicle as it shrank sinking or being drawn inwards. It is as well to leave about a quarter of an inch protruding beyond the clamp, and this should be touched with solid perchloride of iron, by which the tissue is tanned until it becomes quite dry and leathery, and is preserved from putrid decomposition.

When dividing the pedicle and separating the cyst, the utmost care must be taken to prevent any of the contents of the cyst entering the abdominal cavity. Should this have happened notwithstanding all the precautions taken to avoid it, the cavity must be carefully sponged and cleaned of all extraneous substance with soft sponges wrung out of warm water.

The omentum, the mesentery, and the situations of the adhesions to the anterior abdominal wall will often be found

the seat of hæmorrhage, either from the orifices of large vessels or from capillary oozing. The bleeding must be stopped by tying the vessels with ligatures, the ends of which are to be cut off close to the knot, or by torsion, or by the pressure of a needle passed across.

As soon as the pedicle has been secured and the tumour removed, and any omental or other vessels injured during the separation of adhesions, and bleeding, have been tied, the other ovary should be examined. It is easily found by grasping the fundus of the uterus, and passing the hand downwards along the side of the uterus, and a little away from it. If the ovary is healthy, it is found to be of about the normal size and consistence. Its surface may be irregular from recently matured Graafian follicles, but these need not lead to interference unless the ovary is two or three times its normal size. If one or two Graafian follicles are very large, they may be punctured, and the clot they contain squeezed out. If the ovary is hardened or so enlarged that disease appears likely to go on, it should be removed. Occasionally the pedicle may be long enough, especially if the cyst be of considerable size, to admit of the application of a second clamp; and I have fixed two clamps outside the abdominal wall with little more inconvenience to the patient than one. In other cases I have transfixed the pedicle of the second tumour, tied it in two or more portions, brought it outside, and tied it to the clamp securing the first pedicle. In other cases, where there was no pedicle, but a close attachment of the ovarian tumour to the side of the uterus, after transfixing the attachment, tying it, and cutting away the tumour, I have cut off the ends of the ligatures short and left them. In one recent case, where two ovarian cysts had burst, the contents had escaped into the peritoneal cavity, and general chronic peritonitis had followed. Both pedicles were secured in separate clamps, one to each pedicle, and they were easily kept above the united wound. The patient made a good recovery.

Besides examining the second ovary, the state of the uterus should be ascertained. It may be enlarged by pregnancy, as fully described in Chapter VI., or it may be enlarged by fibroid growths or out-growths. In one case, after completing ovariotomy I also removed a fibroid out-growth from the

fundus uteri. This patient died, and I think she would have recovered if I had left the uterus alone, as I have done in five or six cases since. These growths, unless of very large size, seldom cause much inconvenience, and it is far better to leave them untouched than to endanger the success of ovariotomy. In case of increase years afterwards, any necessary treatment can be adopted when the patient is in a better state for bearing it. I have removed large uterine fibroid tumours by gastrotomy with one or with both ovaries, but here the chief disease was uterine, not ovarian, and the subject of the treatment of uterine tumours, although of great importance, and one in which we may hope that the surgery of the future will earn as great a triumph as the surgery of the present day has in the treatment of ovarian disease, cannot be considered in this volume.

Before proceeding to close the wound, the peritoneal cavity must be thoroughly cleansed from any fluid or clot which it may contain. A good deal of fluid may be simply pressed out, or scooped out as it were, by the hand of the operator; but complete cleansing can only be effectually attained by using many clean, soft sponges in succession, passing them well down behind and in front of the uterus, along each flank in front of the kidneys, and over the abdominal wall wherever adhesions have been separated, carefully removing any clot which may be seen or felt among the coils of intestine or folds of omentum. When I began to insist upon the importance of this process, which Dr. Worms described as *la toilette du péritoine*, other operators said that it was unnecessary or injurious; that ovarian fluid in the peritoneum was harmless; or that the time lost in removing it, and the irritation caused by the sponging, were greater evils than a little fluid or blood left in the cavity. Impressed by these objections, I was in one case less careful than usual in sponging away ovarian fluid. A fatal result followed, and I at once published the case, rather as a warning than an example, and I have ever since been extremely careful to remove all I possibly could by thorough sponging, and have been well satisfied with the general results. I have regretted incomplete sponging, never that I had been too careful. And it is very convenient to insert a large, broad, flat piece of thin sponge just within the wound, and leave it all the time that the sutures are being passed. It protects the intestines and peritoneal

cavity generally, and catches any drops of blood which may follow the passage of the needles.

The next step will be to close the wound. In my early cases I did this by passing ordinary or gilded hare-lip pins through the whole thickness of the abdominal wall at intervals of an inch. Each pin perforated the skin about an inch, and the peritoneum about half-an-inch, from the incision on either side; so that when the two opposed surfaces were pressed together upon the pin, two layers of the peritoneum were in contact with each other. But I soon began to use and prefer sutures to pins, and tried different materials for this purpose—hemp, twine, silk, silver and steel wire, telegraph wire coated with gutta-percha, and strong horse-hair. After repeated comparative trials I found thin strong Chinese silk superior to the other materials.

The most convenient manner of applying the sutures is the following. Silk about eighteen inches in length is threaded at each end on a strong straight needle. Each needle is introduced from within outwards, through the peritoneum and the whole thickness of the abdominal wall, at the same distances as when the hare-lip pins were used. The ends of the sutures are held by the assistant, who draws up the lips of the wound until all the deep sutures have been applied. Then the lips of the wound are held apart again, in order that the operator may convince himself that no further bleeding has taken place within the abdominal cavity, which, if required, has to be sponged again, and the protecting sponge removed. This done, the sutures are tied, and the ends of the threads cut off. If the abdominal wall is very thick, superficial sutures may be required between the deep ones. If the pedicle has been secured by the clamp, a suture should be passed close to the latter, in order to bring the lips of the wound so accurately around the pedicle that the peritoneal cavity is perfectly closed. The including of the peritoneum within the stitches is of the utmost importance for the success of the operation. The two peritoneal layers adhere together very rapidly. At the post-mortem examination of patients who died after twenty-four hours, the edges of the peritoneal incision have been found firmly united by first intention. Thus pus and other secretions from the wound are prevented from entering the peritoneal cavity,

adhesion of the omentum or intestine to any part of the inner aspect of the wound not covered by peritoneum is prevented, and such firm union is secured that a ventral hernia scarcely ever occurs after recovery.

After the closure of the wound, that part of the abdomen which has been exposed is carefully dried and cleaned, the india-rubber cloth removed, and the wound covered with folded lint and supported by long strips of adhesive plaster. In many cases the false ribs have been pressed outwards by the tumour, and after its removal a deep hollow is left. This must be filled up with pads of cotton-wool. The patient is then gently removed to her bed, where a flannel belt is adjusted around her abdomen. She is kept on her back, her knees supported by a pillow, is covered with light but warm blankets, and provided with hot-water bottles, if she is at all chilly. The room is darkened, and she is left alone with her nurse.

CHAPTER XVI.

ON THE TREATMENT OF PATIENTS AFTER OVARIOTOMY.

The treatment of patients after ovariotomy may be considered under three distinct heads: first, the conditions under which the patient is placed, and the duties of the nurse; secondly, the medical treatment; and thirdly, the surgical treatment.

A large, lofty, quiet, airy room, neither too hot nor too cold; two comfortable, small, clean iron bedsteads, with hair mattresses, and light, warm bedding, so that the patient may be lifted from one to the other, and have a fresh bed every day; the personal linen so contrived that it can be changed every day without much disturbance of the position of the patient; the windows provided with shutters or blinds disposed so as to admit only an agreeable amount of light, or to maintain a soothing twilight; an open fire, which, with an open window, secures a fitting temperature with natural ventilation; a floor free from all woollen covering—these things together form a combination of favourable conditions which, important in general surgery and in the treatment of every case of severe illness, are even more imperatively necessary after ovariotomy. It is in attention to minute details, and in the observation of the ill-effects which follow the neglect of any of them, that the practitioner is taught their importance, and learns how much of his success depends upon careful and intelligent obedience in those who are entrusted with their performance.

The duties of the nurse are to use the catheter about every six hours, or oftener if the patient desires it, in order to render any movement or muscular effort on the part of the patient unnecessary. This should always be done for at least three or four days; and it is often much longer before a patient is able to dispense with the use of the catheter. The nurse should also be quite capable of inject-

ing into the rectum, either small quantities of food, or such doses of some opiate as may be found necessary to relieve pain. She should be ready to supply the patient either with warm or cold drinks, or with such light nourishment or stimulants as may be directed. A succession of small opiates, left to the discretion of an intelligent nurse, with directions to give only enough to keep the patient free from severe pain, answer better than larger doses administered at stated intervals under medical prescription. Stimulants, such as brandy or champagne, must also be left to the nurse, but with explicit directions that they are only to be used when called for by faintness, or chilliness, or some sign of exhaustion. Very little food is required during the first three days after the operation, but the nurse should have a good supply of well-made barley-water, toast and water, thin gruel, water arrow-root, bread and milk, chicken broth or beef tea, or any other light nourishment which the patient may fancy. These she may be allowed to take almost as freely as she pleases, provided she is not sick. Should sickness be troublesome, a little brandy in iced soda water, or champagne iced, will often relieve it; but it is often only a sign of weakness, and is best met by enemas of beef-tea, either with or without egg and brandy, thrown into the rectum, in quantities of not more than two ounces, at short intervals. Before throwing anything into the rectum, and at any time when flatulence is distressing a patient, the nurse should introduce an elastic tube or the injection pipe some two or three inches into the rectum, in order that flatus may escape without straining effort, and also to allow of the escape of any previously injected and unabsorbed food. The nurse should be able to take and record temperature observations with the thermometer, at stated hours, or on the occurrence of any febrile symptoms. She should watch the urine of the patient, and as soon as it becomes scanty or concentrated, depositing urates on cooling, she should be directed to give the patient every two or three hours some lithia water, or a mixture of the citrates of potash and lithia.

Beyond this administration of lithia and potash, and opiates in sufficient quantity to relieve pain, *medical treatment* may be said to consist in doing no harm, providing the case go on without any serious complication. But if peritonitis, either of

the sthenic or traumatic character, or of the septic variety, occur, the fever accompanying either form of inflammation must be watched; and if the temperature of the body as shown by the thermometer rises considerably above the normal standard, means must be taken with the object of lowering the temperature. Some details of the mode of carrying out this treatment may be found in the chapter on Renal Cysts.

The bowels are kept quiet after the operation; and as long as the patient feels comfortable, their action need not be brought on, even if they do not act for ten days or more. I have known them nineteen days without acting, and then act naturally without any painful effort. An enema of warm water or a dose of castor oil will bring on their action if not spontaneous. Accumulation of hard fæcal masses in the rectum may cause tenesmus, keep up a spurious diarrhœa, and thus render the patient uncomfortable. Their presence will be discovered by digital examination. They should be broken up with the finger or a spoon, and the bowels afterwards cleared by injecting warm water. If the first motion fatigues the patient and renders her restless, it will be advisable to have it followed by an opiate enema.

Flatulence, often a very troublesome symptom, may be relieved by passing the elastic tube of an enema apparatus up the rectum. An enema of five grains of quinine in an ounce of water, with or without a few drops of laudanum, repeated every four hours, has often relieved flatulence by restoring the tone of the muscular coat of the intestines, and occasionally Faradisation has proved useful in the same way.

Surgical Treatment.—The various conditions following ovariotomy which may call for surgical treatment may be arranged in order, commencing with the wound in the abdominal wall and the separation of the pedicle; collections of serum, blood, or pus in some part of the peritoneal cavity; adhesions between the intestine and the pedicle, or the abdominal wall, leading to intestinal obstruction.

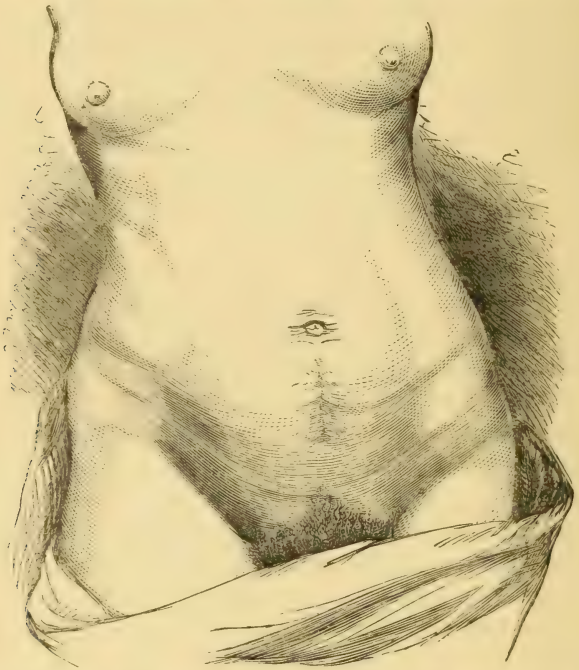
Unless the abdominal wall is œdematous, or the dressing is moistened, it is better not to disturb the bandage or plaster until thirty-six or forty hours after operation. And then it is not necessary to raise the plaster from the sides of the abdomen; it should be raised near the clamp and divided with scissors two

or three inches on one side of the wound, then raised and divided on the other side. In this way the clamp and the wound may be uncovered without disturbing the patient. After removing any soiled lint from over the wound and round the clamp, and replacing this by dry lint, fresh strips of plaster are applied; the plaster left on either side being used as splints, and drawn together by the new plaster, so as to take off all tension from the wound. Daily dressing is then necessary in order to keep the wound and pedicle dry. I never use water, but simply wipe away all moisture by cotton wool or shreds of lint. The stitches are removed on the third, fourth, or fifth days, first removing those which appear the tightest, or which cause irritation. In very stout or feeble patients union may be slower, and the stitches may be left longer. As a rule, union takes place without any suppuration, but occasionally a little pus will exude from one or more of the points of suture. This may cause a little feverishness, but is not of much consequence. Three or four times I have seen considerable collections of pus in the abdominal wall, always in very fat patients. In such cases care must be taken to avoid any dressing which would interfere with the free escape of the pus.

In every case after removal of the sutures, the abdomen should be supported by adhesive plaster for at least a fortnight, or until the wound is firmly agglutinated. Tympanites, hiccup, and vomiting might easily separate the edges of a wound which had united fairly well, if these edges were not well supported. In six cases I have seen more or less re-opening of the wound; in two the sutures were removed too early, and the abdominal walls were not supported by plaster; in other two cases there was pyæmia or septicæmia, and the plastic process was slow on account of the state of the blood; in the other two cases the accident was caused by violent cough on the seventh or eighth day, a day or two after the stitches had been removed. These two patients recovered, the others died. In all, the stitches were replaced as soon as I was aware of the occurrence.

Unless the pedicle is very short, the clamp lies across the lower part of the wound, as shown at page 381, without any depression of the abdominal wall, and the patient is quite unconscious of its presence. Sometimes, with a very short pedicle, the clamp and the integuments are drawn almost down

to the sacrum, even then, without much complaint from the patient. There will sometimes be protrusion of the pedicle behind the clamp, separating the lower edges of the wound. When this occurs, the lowest stitch should be removed, as the protrusion is due to obstructed return of blood through the veins of the pedicle. Two or three times the protrusion has been so great that I have passed a pin through the pedicle behind the clamp, tied a ligature below the pin, and cut away both clamp and pedicle; but this is seldom necessary, as the swelling subsides soon after the removal of the compression caused by the too tight stitch. The clamp and the portion of pedicle compressed by it generally fall off from the seventh to the tenth day, sometimes as early as three or four days, and



sometimes not for fifteen or more. It is important not to remove the clamp too soon, especially if the pedicle is short, as the newly-formed adhesions between the pedicle and the abdominal wall might give way, and the pedicle sink into the peritoneal cavity, leaving an opening which, after healing of the skin, would admit of the easy production of a ventral

hernia. But when the clamp is only held by a few shreds of dead tissue, it may be removed. A little ulceration of integument from pressure of the clamp should not lead to the premature removal of the clamp, as this is of far less consequence than the risk of removing the clamp too soon. The woodcut on the opposite page, copied from a photograph taken by Dr. Wright, shows the ordinary appearance of the abdomen with the cicatrix in a young person three weeks after operation.

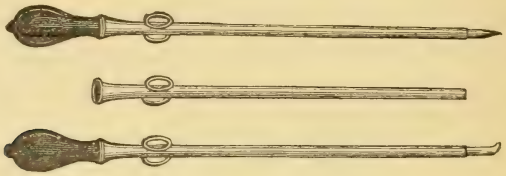
Where a clamp has not been used, but the patient has been treated by one or other of the intra-peritoneal methods, union by the first intention along the whole length of the incision is usually complete. The delay in the union at the lower angle of the wound, where the remains of the pedicle are fixed, may protract the complete cicatrisation to the third or fourth week, but this is of little consequence, and need not interfere with the movement of the patient.

When bad symptoms follow ovariotomy—pain, vomiting, fever with abdominal distension—the surgeon should suspect that some fluid, either serum, blood, or pus, is collecting in the peritoneal cavity. It may collect in such quantity as to give rise to sensible fluctuation from one side of the abdomen to the other; or it may gravitate to the bottom of Douglas's space, and form a tense swelling behind the uterus, easily felt through the vagina, although there may be no free fluid perceptible in the abdominal cavity. If the pedicle has been treated by ligature, the ends of the ligature passing outwards then serve as drainage conductors, and a very free discharge of fluid may go on for several days. Kœberlé prepares for drainage by introducing strong perforated glass tubes, and by the aid of a syringe fitted to the tubes, he withdraws fluid several times daily. Peaslee has advocated and adopted with success this system of drainage, with the addition of repeated washings out of the peritoneum with warm water and disinfecting solutions. In a few bad cases I have also followed this practice, but never with success.

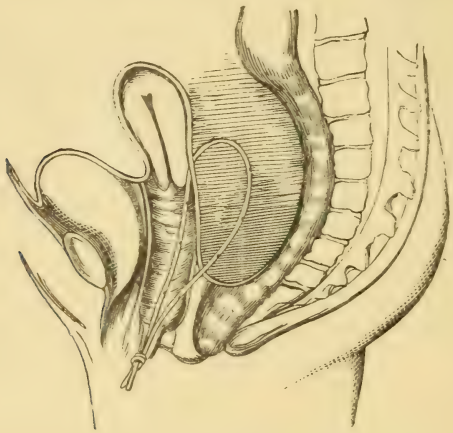
In most of the cases reported by Peaslee as treated with peritoneal injections, the pedicle was dealt with after Clay's method: that is, it was transfixed, each half was tied, and the ends of the ligatures were allowed to hang out of the wound. In one, the ligatures were brought out through a vaginal

canula. In all, the convalescence was very tedious, and three had septicæmia. The most remarkable of the whole, as regards the treatment, was that in which one hundred and thirty injections were made into the peritoneal cavity in seventy-eight days. The last ligature came away, and pus ceased to be secreted, on the ninety-fourth day after operation.

Whenever fluid can be detected by vaginal examination in the neighbourhood of the uterus it is usually in such quantity that it must be removed; and this is done either by Scanzoni's trocar, the straight instrument, with triangular canula, here shown, or by a curved trocar, over which an



elastic catheter is fixed, instead of a canula; or by a trocar still more curved a piece of drainage tube may be inserted and fastened, as shown in the next cut. I introduced this tube in a



case where it led to free discharge, which was followed by complete recovery.

An unmarried girl, eighteen years of age, was sent to me by Dr. Whitehead, of Manchester, as a favourable case for ovariotomy, and was admitted to the Samaritan Hospital on the 5th of June, 1864. The disease dated from the commencement of the catamenia, five years before, and six months after a leg had been broken. Increase had been rapid at first, but latterly slow. She had not been tapped. A point of great interest in diagnosis was observed in this case: the tumour was observed to move very freely beneath the abdominal parietes on deep inspiration, and I therefore expected to find a non-adherent tumour; but at the operation very firm adhesions had to be separated. They were, however, sufficiently long to admit of the cyst moving freely. Ovariotomy was performed on the 13th of June. Dr. Parson gave chloroform. On making an incision four inches long midway between the umbilicus and symphysis pubis, three small cysts filled with gritty matter were exposed in the cellular tissue between the sheath of the recti and the peritoneum. These were dissected out. Long and very firm adhesions anteriorly and in the right iliac fossa, and a very extensive surface of adherent omentum, were separated by the hand with some difficulty, and a close adhesion to the fundus of the bladder was separated by very careful dissection. Eleven pints of fluid were removed by the trocar. The ovary appeared normal, while the tumour was attached to its external angle by a narrow pedicle, about one inch in length. The ovary was, however, removed with the tumour. A small pedicle was secured close to the uterus by a silk ligature, which was cut off short and returned. There was very little bleeding, and the wound was closed in the usual manner. The stitches were removed forty-four hours after operation, the wound being perfectly united. On the third day after operation some sharp pain came on, which became easier after a uterine discharge like menstruation appeared. She continued doing well till the 22nd (ninth day), when, after a sleepless night from pain and flatulence, she was found in a state resembling typhus fever—dry tongue, dilated pupils, flushed face, and drowsiness. As this condition became more decided in the afternoon, I examined by the vagina and rectum, and, detecting fluid between them, made a puncture by a trocar, and let out five ounces of dark bloody serum which

had a putrid ammoniacal odour. This was followed by some relief. The pulse sank from 112 to 95 and 92, but mucous diarrhœa came on, and the typhoid condition was aggravated next day. As the discharge from the trocar puncture had ceased, and examination detected fluid still in the recto-vaginal space, I made another opening into it, and evacuated ten ounces of fluid still more putrid than that of the day before, and containing pus. I then carried on the trocar through the opening made the day before, and drew a drainage tube through the canula before withdrawing it. The tube was then tied and left fixed, as shown in the diagram on page 392. I took great care that it should pass through the lowest point where the peritoneum is reflected from the rectum to the vagina. Very free discharge came through the tube for several days, and the general condition rapidly improved. The tongue and mouth were covered with aphthous spots for several days, and diarrhœa was troublesome. But the tube was removed on July 1st, and convalescence was rapid. She was sitting up on the 6th, and was to leave for the country on the 14th. She went to the Seaside Convalescent Home at Eastbourne, remained there a month, and returned in perfect health.

The result of my experience is, that the danger of puncture has been very greatly exaggerated ; that the benefit of the evacuation of fluid is often very marked ; and that any danger arises from too early closing of the opening, not from the opening having been made. Where, in cases of blood-poisoning, it is very important to maintain a free passage for putrid fluids, the drainage tubes of Chassaignac render most valuable service.

The most alarming symptoms which occur after ovariotomy are those which depend upon obstructed intestine. I heard of one case which has never been recorded, where a loop of intestine slipped through one of the loops of wire used as sutures for the wounds, and was tightly compressed when the wire was fastened. In a published case, there is very little doubt that a fæcal fistula was caused by perforation of intestine with the stitch closing the wound. In one of my early cases, a coil of intestine was compressed between the pedicle and the abdominal wall, and I have seen others since, where the same accident would have happened if I had not been on my guard. After the intra-peritoneal methods of dealing with

the pedicle by ligature and by cautery, I have seen fatal obstruction of the intestine caused by adhesion of coils of intestine around the divided end of the pedicle at such sharp angles that the canal was quite closed; and I have seen adhesion of intestine to a pedicle secured by the clamp lead in the same way to obstruction. The following case illustrates the course of the symptoms when this fatal complication presents itself:—

A single woman, thirty-five years old, was sent to me by Dr. Giles, of Oxford, and was admitted to hospital in March 1867. The whole abdomen was filled by a multilocular ovarian cyst. The girth was forty-two inches, measurement from umbilicus to sternum ten, to pubes eleven, to right ant. sup. spine of ilium ten, and to left twelve and a half inches. The uterus was healthy, and its mobility free. The growth had been first observed in October 1865. Increase had been slow at first, but more rapid since January 1867. Since the growth had commenced, the catamenia had recurred at shorter intervals and in greater quantity, and pain had been generally violent for three or four days before each period commenced. As there was no cyst large enough for any relief to be gained by tapping, ovariotomy was performed on March 27. An incision six inches long was made between the umbilicus and pubes, some extensive recent adhesions were easily separated by the hand, the largest cysts were successively tapped or broken up and emptied, and the whole tumour removed. A pedicle, two to three inches broad at its narrowest part, and about one-third of an inch thick, connected the base of the tumour closely to the right side of a small hard uterus, of irregular shape from a fibroid nodular outgrowth. A cautery clamp was applied, and the pedicle separated by hot irons. On opening the clamp, the compressed and seared pedicle appeared at first quite secure. But as the pedicle was slowly separating from the blade of the clamp to which it adhered, three vessels bled freely. These were tied, and then, as there was some oozing of blood all along the line of eschar, I transfixed the pedicle close to the uterus, tied the pedicle in two halves, and allowed it to sink into the abdomen, after cutting off the ends of the ligature short. Scarcely any sponging was necessary, as no ovarian fluid had entered the peritoneal cavity. The left

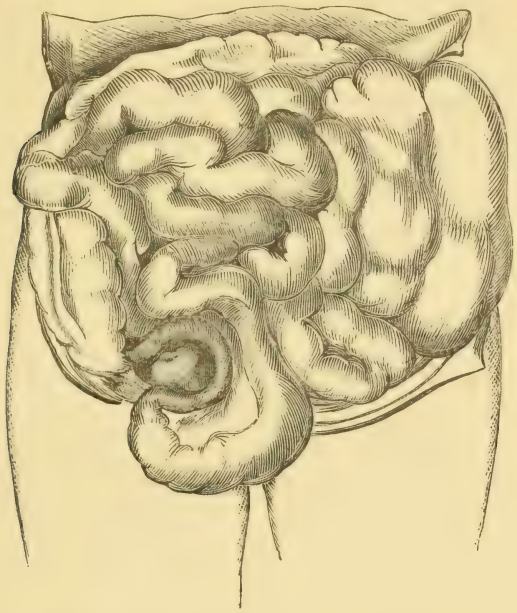
ovary was healthy. Eighteen pints of colloid fluid were removed, and the more solid portion of the tumour weighed five pounds.

On examining the root of the tumour after removal, seven or eight arteries as large as a crowquill were observed entering the tumour and forming numerous corkscrew-like ramifications. Dr. Junker found a number of yellow tubercles imbedded in the stroma of the tumour—both in the periphery and near the base—separate, as minute yellow and greyish-yellow spots; and confluent, of the consistence of cheese.

The state of the patient after operation was unsatisfactory from the first, but there was not much pain. Some sickness on the day after operation increased on the second day, and the abdomen became tympanitic. On the third and fourth days the vomiting continued, a great deal of dark green or coffee-coloured fluid being thrown up. A free fluid motion was followed on the fifth and sixth days by some improvement, although the vomiting of large quantities of greenish fluid continued. On the seventh morning the patient appeared much better; but in the evening the pulse was 160, and she appeared almost moribund. Five grains of quinine were given every three hours by mouth and rectum. In sixteen hours thirty-five grains had been given, and on the eighth day the pulse had fallen to 120. In the next ten days she improved in many respects. There was no vomiting, but she suffered at times with abdominal pain and much flatulence. On the nineteenth day she appeared remarkably well; but at night, after a free watery motion, she suddenly became faint and sick, and died on the morning of the twentieth day.

The wound was found firmly united. There were scarcely any traces of general peritonitis. No intestine was adherent near the wound, but one coil slightly adhered above the umbilicus. The uterus was small, and had a fibroid nodule the size of a marble projecting from its fundus. The left ovary was healthy. The pedicle of the tumour of the right ovary was closely surrounded—as shown in the accompanying engraving, copied from a drawing made by Dr. Junker—by an adhering coil of the ileum just before it enters the cæcum. About an ounce of pus was circumscribed by this adhering intestine around the end of the pedicle, so that none of the

pus entered the peritoneal cavity. The canal of the adhering coil of intestine was almost completely obstructed, partly by the sharp curves at which it was fixed, and partly by the contraction of the adhering portion, the intestine above being much



distended. There was neither blood, lymph, nor serum in the peritoneal cavity, nor could any tubercular deposit be found.

In all these cases the symptoms are exactly those of strangulated hernia. They may be relieved by opium or belladonna, but are almost certainly fatal if the obstruction cannot be overcome. More than once I have separated adhering intestine from the pedicle, and with temporary relief, but new adhesions followed and ultimately death. Sometimes, long after recovery, more or less complete obstruction of intestine is followed by the formation of a fæcal fistula.

Such cases are recorded by Dr. Lyon, of Glasgow, Dr. Keith, of Edinburgh, and Mr. Bryant. Once the same thing happened in a patient of my own. In Dr. Lyon's case the operation was performed in February 1866, 'easily and favourably.' Hiccup and severe vomiting were present for a few days, and

it was afterwards found that union of the edges of the wound was imperfect. A portion of intestine was to be seen adherent at the bottom of the wound. Pin-like perforations took place in this, and gave issue to fæcal matter and offensive gas. Various means were taken to obtain healing, but in August 1867 the wound, or rather the small exposed portion of perforated intestine, remained unchanged.

Dr. Keith operated on a patient, aged thirty-two, in October 1865. Both ovaries were removed, the pedicle of the second being so short that it was tied with silk ligatures, the ends cut off short. The patient recovered rapidly, and at the end of six weeks was quite well. She then began to have pain and irritation in the pelvis, and in December pelvic abscess formed and pointed a little above Poupart's ligament. By January 1867 the opening was almost closed, but the following May there was a sudden escape of coagulated blood from the rectum, followed by a free discharge of pus from the opening in the groin. Fæcal matter soon made its appearance, and continued to flow till July, when the fistula finally closed. This is the only case of the kind which has fallen to Dr. Keith, and it was also the only one in which at the time he published the case he had returned the pedicle with the ligatures into the abdomen after ovariotomy.

Mr. Bryant's was a case of successful ovariotomy in 1867. The pedicle was transfixed and tied with whipcord; the ends of the ligature being cut off, they were allowed to sink into the abdomen with the pedicle. These ligatures were discharged some months afterwards through an artificial anus at the lower part of the abdominal wound, which in the end healed up completely.

The operation in my case was performed on March 10, 1864. The patient was fifty-seven years of age. She had been tapped three times, and had suffered from several attacks of circumscribed peritonitis. A large multilocular cyst of the left ovary was removed. It had so displaced the uterus that the pedicle seemed to be on the right side, but it afterwards appeared that the right ovary was healthy. The pedicle was transfixed, each half tied separately, the whole surrounded by a third ligature; and the tied end, after separation of the tumour, was returned into the abdomen with the

ligatures, the ends of which were cut off short close to the knots. A portion of the cyst adhered so firmly in the left iliac fossa that it could not be separated, and it was left adherent, after transfixing and tying it, leaving the ends of the ligature hanging out of the lower angle of the wound. The patient recovered, and went to Leeds on April 14, five weeks after the operation, the ligatures still keeping the lower part of the wound open, and a little discharge daily escaping beside them. She bore the journey well, and improved till May 6, when, after fatigue, she had a severe rigor, followed by vomiting and bilious diarrhœa. Fever and profuse perspiration followed, and the discharge became more abundant along the track of the ligature. On May 10, 1864, the late Mr. Teale, of Leeds, wrote: 'Yesterday evening the discharge was evidently feculent, and continues so to-day.' On the 11th he wrote: 'The discharge is now simply purulent, without any stain of fæcal matter. The ligature has yielded considerably this morning, but is not yet quite at liberty.' On May 31, the ligature came away, the discharge gradually lessened, and the patient considered herself to be well. She came to London in October; and, although there was a very slight oozing of pus from the lowest part of the cicatrix, she appeared to be perfectly well. She remained well during the winter and early spring, but in May, 1865, Mr. Teale wrote to tell me that for some weeks past there had been 'at intervals a considerable increase of discharge from the sinus, attended with uneasiness, but not with severe pain. The odour of the discharge is offensive—not putrid, but faint or albuminous. I do not think there is any lodgment of matter. It seems to escape freely as it is secreted. Deep in the left iliac region is a general state of solidity of the parts, as contrasted with the opposite side.'

It should be remembered that although the ligature which had been left hanging out through the wound in the abdominal wall had come away in May 1864, there was no proof that the ligatures tied on the pedicle after transfixion, and cut off short, had come away. Mr. Teale thought they might be present, and keeping up irritation. He adds, 'To-day I examined the sinus with an elastic catheter, and at the depth of $4\frac{1}{2}$ inches encountered a solid resistance. Having introduced a hollow

elastic tube open at the end, I passed through it a fine wire stilet, hooked at the end, and tried to angle for the retained ligatures, but without success. These proceedings were conducted in the most gentle manner, and did not cause the least distress.' On May 25, Mr. Teale again wrote: 'She has been slightly feverish and frequently troubled with diarrhœa, and I have not thought it right to attempt any mechanical treatment. The discharge is less in quantity, but I think it has shown a little fæcal tinge.'

After this the discharge became more abundant and more decidedly fæcal, varying in quantity from day to day. She often complained of a feeling of painful distension at the lower part of the abdomen. This was generally followed by a gush of acrid irritating discharge, and then by relief. The amount of fæcal matter in the discharge varied considerably. If the bowels were not relaxed, there was little or none. Latterly, however, as she became confined to bed, she had frequent attacks of diarrhœa, and then fluid fæces escaped in considerable quantity from the fistula. But no solid fæces ever passed. She gradually became weaker, and died December 20, 1865, about twenty months after ovariotomy.

I am indebted to Mr. T. P. Teale for a report of the post-mortem examination. 'The fistulous opening on the surface of the abdomen was large enough to admit the tip of the little finger. Within the abdomen it was so dilated as to admit a middle finger at least. On opening the abdomen we found the edge of the omentum adherent to the wall at the level of the wound—a coil of small intestines sealing the wound above the fistula, which latter was at the lower extremity of the wound. The omentum and sub-peritoneal tissues were excessively loaded with adipose tissue. A small part of the small intestine, the sigmoid flexure, and the rectum were matted together around the fistula and the left corner of the uterus. Close to the left side of the uterus was a mass, almost spongy and pedunculated, which projected towards the rectum. In the centre of the mass was a large suppurating cavity which communicated with the fistula and with the rectum, by two large openings. The cavity extended for some distance between the uterus and the rectum. It passed towards the right side behind the lower part of the uterus; downwards

by the side of the rectum ; and forwards as far as the femoral ring. No trace of any ligature could be found. The right ovary was healthy. The liver was greatly enlarged and much altered by fatty degeneration.'

I think this case, like the others, tells against the practice of tying the pedicle of an ovarian tumour, whether the ends of the ligature are left hanging out between the lips of the wound, or are cut off short and returned. The formation of a sort of canal or sinus by the adhesion together of folds of omentum or coils of intestine, in such a manner as to enclose the ligature and shut it off from the general peritoneal cavity, occurs, I believe, very generally when the ends of the ligature are not cut off. If the patient recover, one might expect more or less obstruction of intestine to follow such adhesions ; and at p. 397 is a drawing of a case where such obstruction has been actually proved. When the ends of the ligature are cut off and the pedicle returned, we know from repeated post-mortem examinations that a similar adhesion of neighbouring intestine takes place around the end of the pedicle ; and that, in some cases, pus has been circumscribed in this manner—until at length it has found an outlet, either through the abdominal wall, the vagina, or intestine. The occasional observation of cases of this kind (when at distant intervals I have been driven to adopt one or other of the intra-peritoneal methods of dealing with the pedicle) has led me more and more to the conviction that the clamp, or some other extra-peritoneal method, is not only more successful as regards the immediate result of the operation, but even more so still if we look to the subsequent health of the patient. Patients who recover after the extra-peritoneal treatment of the pedicle, as a rule, soon regain and maintain perfect health. So do many of those who recover after the intra-peritoneal treatment. But some of them, sooner or later, suffer from chronic suppuration, hæmatocele, or fæcal fistula ; or, perhaps without any definite local ailment, are many months before they become strong and well.

The Table which is commenced on the next page gives particulars of every case from 1 to 500 in which I have completed ovariotomy.

TABLE OF FIVE HUNDRED CASES

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
1	Hospital	1858 Feb.	29	Single	Parietal
2	Hospital	,, Aug.	38	Married	Parietal and intestinal
3	Hospital	,, Nov.	33	Married	Omental and intestinal
4	Hospital	1859 Jan.	39	Single	None
5	Hospital	,, May	43	Married	Omental
6	Hospital	,, June	29	Married	Omental and intestinal
7	Hospital	,, June	29	Single	Omental and intestinal
8	Hospital	,, July	47	Married	Parietal and omental. Both ovaries removed
9	Dr. Ridsdale	,, Oct.	41	Married	Omental
10	Mr. Huxtable	,, Oct.	37	Single	Cæcal
11	Hospital	,, Oct.	29	Single	Parietal
12	Mr. Whipple, Plymouth	,, Oct.	38	Married	Parietal and omental.
13	Mr. Peirce, Notting Hill	,, Nov.	17	Single	Parietal and omental.
14	Hospital	,, Dec.	27	Single	Parietal and omental.
15	Hospital	1860 Jan.	23	Single	Omental
16	Dr. Whitehead, Manchester	,, Feb.	26	Married	None
17	Hospital	,, Feb.	33	Married	Parietal and omental.
18	Dr. Ramskill	,, July	41	Married	Parietal and omental.
19	Dr. Rigby	,, July	36	Single	None
20	Mr. McCrea, Islington	,, Oct.	53	Married	Parietal and omental.
21	Hospital	1861 Jan.	54	Married	Parietal and omental.
22	Dr. Grimsdale, Liverpool	,, March	22	Single	Omental
23	Dr. Bainbridge	,, April	55	Married	Parietal and omental.
24	Hospital	,, April	42	Married	Parietal
25	Hospital	,, June	34	Single	None
26	Hospital	,, July	31	Married	Parietal
27	Hospital	,, Aug.	27	Single	None
28	Dr. Grant	,, Aug.	35	Single	None
29	Dr. West	,, Oct.	54	Married	None
30	Hospital	,, Dec.	50	Single	Parietal

OF COMPLETED OVARIOTOMY.

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Ligature . .	26 pounds	3 inches	Recovered	Married. Well in 1868	1
Ligature . .	31 ,,	4 ,,	Recovered	Died 7 years after from cancer	2
Clamp . .	81 ,,	4 ,,	Recovered	Died 10 months after of peritoneal cancer	3
Clamp . .	10 ,,	7 ,,	Died, 32 hours	Septicæmia	4
Clamp . .	10 ,,	4 ,,	Recovered	Well in 1872	5
Clamp . .	7 ,,	4 ,,	Died, 2nd day	Peritonitis	6
Clamp . .	?	6 ,,	Recovered	Well in 1872—still single	7
Clamp . .	?		Recovered	Died 2 years after of hemiplegia	8
Clamp . .	38 ,,	5 ,,	Recovered	Girl born 13 months after operation, labour easy—remains well, 1872	9
Clamp . .	19 ,,	7 ,,	Died, 4th day	Peritonitis	10
Clamp . .	42 ,,	4 ,,	Recovered	Well in 1872—still single	11
Clamp . .	53 ,,	4 ,,	Died, 9th day	Tetanus	12
Ligature . .	38 ,,	4 ,,	Recovered	Married June 1865—3 boys and 1 girl since, labours all natural. Well in 1872	13
Clamp . .	54 ,,	4 ,,	Died, 23 hours	Collapse	14
Clamp and ligature	25 ,,	5 ,,	Recovered	Married 1865—1 boy and 1 girl since. Well in 1872	15
Ligature . .	25 ,,	4 ,,	Died, 30 hours	Septicæmia	16
Clamp and ligature	31 ,,	7 ,,	Died, 46 hours	Intestinal obstruction	17
Pin and ligature	26 ,,	4 ,,	Recovered	Well in 1871	18
Pin and ligature	24 ,,	4 ,,	Recovered	Well and single in 1872	19
Pin and ligature	58 ,,	4 ,,	Recovered	Health very good in 1872	20
Pin and ligature	20 ,,	6 ,,	Recovered	No return	21
Pin and ligature	16 ,,	3 ,,	Recovered	Married in 1869—girl born 1870. Well in 1871	22
Pin and ligature	20 ,,	3 ,,	Recovered	Died in 1871	23
Pin and ligature	. . .	3 ,,	Died, 24 hours	Septicæmia	24
Pin and ligature	55 ,,	6 ,,	Died, 5th day	Exhaustion	25
Pin and ligature	50 ,,	5 ,,	Died, 3rd day	Exhaustion	26
Pin and ligature	44 ,,	4 ,,	Recovered	Had child 20 months after operation, labour easy. Well in 1872	27
Clamp . .	17 ,,	4 ,,	Recovered		28
Clamp and ligature	35 ,,	5 ,,	Died, 47 hours	Peritonitis	29
Clamp . .	40 ,,	5 ,,	Recovered	Operated on a second time, Feb. 5, 1868, and died Oct. 6, 1868	30

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
31	Dr. Lawford, Leighton Buzzard	1861 Dec.	46	Married	Parietal and omental.
32	Hospital	1862 Jan.	30	Single	Parietal and intestinal
33	Dr. Markham	,, Jan.	47	Married	Omental and intestinal
34	Dr. Whitehead, Manchester	,, Jan.	32	Married	Parietal
35	Hospital	,, May	30	Single	Omental and intestinal
36	Hospital	,, May	41	Married	Parietal and omental
37	Hospital	,, June	35	Married	Omental
38	Dr. West	,, June	28	Single	None
39	Hospital	,, June	25	Married	Parietal
40	Hospital	,, July	20	Single	Parietal and omental.
41	Hospital	,, July	41	Single	Parietal and omental.
42	Dr. Cahill, Brompton	,, Sept.	49	Single	Parietal
43	Hospital	,, Oct.	24	Single	None
44	Hospital	,, Oct.	56	Married	Parietal and omental.
45	Hospital	,, Oct.	43	Single	None
46	Dr. Walshe.	,, Nov.	32	Single	None
47	Dr. Grimsdale, Liverpool	,, Nov.	23	Single	Parietal
48	Hospital	,, Nov.	50	Married	Parietal and omental.
49	Dr. Hawksley	,, Nov.	23	Single	None
50	Hospital	,, Nov.	17	Single	Parietal and omental.
51	Hospital	,, Dec.	42	Married	Parietal and omental.
52	Dr. Martin, Rochester	,, Dec.	53	Single	None
53	Hospital	1863 Jan.	34	Married	Parietal
54	Sir T. Watson	,, Feb.	25	Single	Parietal and omental.
55	Hospital	,, Feb.	56	Married	Parietal
56	Hospital	,, March	36	Single	Parietal
57	Dr. Hare	,, March	29	Single	Parietal
58	Hospital	,, March	36	Single	None
59	Dr. Cooper, Brentford	,, March	26	Single	None
60	Hospital	,, March	26	Married	Parietal and intestinal
61	Hospital	,, April	61	Married	Parietal and intestinal
62	Hospital	,, April	19	Single	None
63	Dr. Dyce, Aberdeen	,, April	37	Married	Parietal, omental, and intestinal
64	Dr. Churchill, Dublin	,, May	33	Married	None
65	Hospital	,, June	50	Married	Parietal and omental.
66	Hospital	,, June	44	Married	Parietal
67	Dr. Dyce, Aberdeen	,, June	37	Married	Parietal and omental.
68	Dr. Llewellyn Williams	,, June	29	Single	None

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Clamp	27 pounds	9 inches	Died, 13th day	Peritonitis	31
Wire Clamp		5 ,,	Died, 30 hours	Diffuse peritonitis	32
Clamp	30 ,,	5 ,,	Died, 5th day	Exhaustion	33
Clamp	40 ,,	5 ,,	Died, 3rd day	Septicæmia	34
Clamp		5 ,,	Died 13th day	Tetanus	35
Clamp		5 ,,	Recovered	Died of spinal meningitis, July 1868	36
Clamp		5 ,,	Recovered	Well in 1872	37
Ecraseur		5 ,,	Recovered	Married 1863—1st child born 1864, 2nd 1866, 3rd 1868. Second operation June, 1869; died third day	38
Ligature		5 ,,	Recovered	Married April 1861—no child. Well in 1872	39
Clamp	40 ,,	6 ,,	Recovered	Married July 1867, and again Aug. 1870. Boy born May 1871, and in May 1872 well and pregnant	40
Clamp		5 ,,	Recovered	Well and single in 1872	41
Clamp		6 ,,	Recovered	Well and single in 1872	42
Clamp	7 ,,	3 ,,	Recovered	Was tapped per vag. March 1872. Single.	43
Clamp	25 ,,	5 ,,	Recovered	Died 1869 of bronchitis	44
Clamp		5 ,,	Died, 40 hours	Peritonitis, with fatty liver and enlarged spleen	45
Clamp		4 ,,	Recovered	Well in 1872—single—menses regular.	46
Clamp		4 ,,	Recovered	Well in 1872	47
Clamp		5 ,,	Recovered	Well and single in 1872	48
Clamp		4 ,,	Recovered		49
Clamp		4 ,,	Recovered	Well in 1870	50
Clamp		4 ,,	Recovered	Health good in 1872	51
Clamp		5 ,,	Recovered	Well and single in 1872	52
Clamp	72 ,,	6 ,,	Recovered	Boy born April 1864; girl 1865—labours natural. Well in 1872	53
Clamp	30 ,,	5 ,,	Died, 44 hours	Diffuse peritonitis	54
Clamp		4 ,,	Recovered	Well in 1872.	55
Clamp	36 ,,	6 ,,	Recovered	Not married. Well in 1872	56
Clamp	48 ,,	5 ,,	Recovered	Well and single in 1872	57
Clamp	15 ,,	5 ,,	Recovered	No return	58
Clamp	30 ,,	6 ,,	Died, 27th day	Pyæmic pleurisy	59
Ligature		4 ,,	Died, 54 hours	Septicæmia	60
Clamp		5 ,,	Recovered	Died Aug. 1863 of cancer	61
Clamp	16 ,,	4 ,,	Recovered	Married 1869; girl born August 1870, labour natural; well and pregnant in 1872	62
Clamp	47 ,,	9 ,,	Recovered	Died of diffuse cancer in 3 months	63
Clamp	20 ,,	4 ,,	Recovered	Boys born July 1865 and Sept. 1867, labours natural. Well in 1872.	64
Clamp	36 ,,	6 ,,	Died, 54 hours	Fibrinous clot in heart	65
Clamp	38 ,,	6 ,,	Recovered	Well in 1872	66
Clamp		6 ,,	Died, 80 hours	Exhaustion	67
Clamp		4 ,,	Recovered	Married Nov. 1868. Boy still-born at 6 months May 1869; girl July 1870. Well in 1872	68

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
69	Dr. F. Bird	1863 June	54	Single	None
70	Hospital	,, June	49	Married	Parietal and intestinal
71	Hospital	,, July	35	Single	None
72	Mr. Baker, Birmingham	,, July	35	Single	None
73	Dr. Symonds, Clifton	,, Aug.	55	Single	None
74	Dr. Gordon, Dublin	,, Aug.	24	Single	None
75	Dr. Hutton, Dublin	,, Sept.	35	Single	None
76	Hospital	,, Oct.	35	Married	Omental
77	Hospital	,, Oct.	23	Single	Parietal
78	Hospital	,, Nov.	33	Single	Parietal
79	Hospital	,, Nov.	32	Single	None
80	Dr. Fox	,, Nov.	19	Single	None
81	Hospital	,, Nov.	33	Married	Omental
82	Sir E. Hilditch	,, Dec.	57	Married	Intestinal
83	Dr. Cahill	,, Dec.	36	Married	None
84	Mr. Stretton, Beverley	1864 Feb.	23	Single	None
85	Hospital	,, Feb.	41	Married	Omental
86	Dr. Playfair	,, March	57	Married	Omental and pelvic
87	Hospital	,, March	23	Single	None
88	Dr. Collet, Worthing	,, March	43	Single	Parietal
89	Dr. Pickford, Brighton	,, April	23	Single	None
90	Hospital	,, April	32	Married	None
91	Dr. Farre	,, April	45	Married	Parietal
92	Hospital	,, April	50	Married	Parietal and omental
93	Sir T. Watson	,, April	21	Single	None
94	Mr. Carden, Worcester	,, April	40	Married	Parietal
95	Hospital	,, May	47	Married	None
96	Sir W. Gull	,, May	46	Single	None
97	Mr. Ridsdale	,, May	40	Single	Parietal
98	Dr. Brown, Haverfordwest	,, May	36	Married	None
99	Hospital	,, May	23	Single	Parietal
100	Hospital	,, June	54	Married	None
101	Hospital	,, June	18	Single	Parietal and omental
102	Hospital	,, July	24	Single	Omental
103	Mr. Picken, Croydon	,, July	28	Married	Parietal and pelvic
104	Sir J. G. Simpson	,, July	32	Married	None
105	Mr. Savile, Rotherham	,, July	41	Single	None
106	Hospital	,, July	35	Single	Omental

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Clamp . .	. . .	4 inches	Recovered	Well and single in 1872	69
Clamp . .	. . .	. . .	Recovered	Well in 1872	70
Clamp and ligature	21 pounds	4 ,,	Died, 78 hours	Clot in heart	71
Clamp . .	. . .	4 ,,	Died, 44 hours	Exhaustion	72
Clamp . .	. . .	. . .	Recovered	Well and single in 1872	73
Clamp . .	. . .	4 ,,	Died, 82 hours	Peritonitis	74
Clamp . .	16 ,,	5 ,,	Died, 40 hours	Peritonitis	75
Clamp . .	. . .	7 ,,	Recovered	No return	76
Clamp . .	. . .	8 ,,	Recovered	Married since. Well in 1871	77
Clamp . .	. . .	4 ,,	Died, 8th day	Peritonitis	78
Clamp . .	17 ,,	4 ,,	Recovered	Well in 1872	79
Ligature . .	. . .	4 ,,	Recovered	Married 1864. Girls born 1865 and 1867; boy 1870; labours natural. Well in 1872	80
Ligature . .	44 ,,	5 ,,	Died, 8th day	Septicæmia	81
Ligature . .	. . .	5 ,,	Died, 3rd day	Peritonitis	82
Ligature. Both ovaries	. . .	5 ,,	Died, 3rd day	Crural phlebitis and septicæmia	83
Clamp . .	16 ,,	4 ,,	Recovered	Married 1867. Girl born 1868; boys 1869, 1870, 1871; well and pregnant in 1872	84
Clamp . .	7 ,,	9 ,,	Recovered	Well in 1872	85
Ligature . .	40 ,,	5 ,,	Recovered	Died 1866 of pelvic abscess and fæcal fistula	86
Clamp and ligature	12 ,,	4 ,,	Recovered	Well and single in 1872	87
Clamp . .	15 ,,	6 ,,	Recovered	Well and single in 1872	88
Clamp . .	29 ,,	4 ,,	Died, 114 hours	Tubercular peritonitis	89
Clamp . .	14 ,,	3 ,,	Recovered	No return	90
Clamp . .	59 ,,	6 ,,	Recovered	Well in 1872	91
Ligature . .	34 ,,	8 ,,	Died, 64 hours	Peritonitis	92
Ligature . .	. . .	3 ,,	Recovered	Well and single in 1872	93
Clamp . .	18 ,,	6 ,,	Recovered	Well and widow in 1872	94
Ligature . .	. . .	5 ,,	Recovered	Well in 1870	95
Ligature . .	25 ,,	6 ,,	Died, 44 hours	Peritonitis	96
Ligature . .	14 ,,	7 ,,	Died, 67 hours	Septicæmia	97
Clamp . .	16 ,,	4 ,,	Recovered	Well in 1872. Girl born since operation. Craniotomy necessary	98
Clamp . .	28 ,,	4 ,,	Recovered	Well and single in 1871	99
Clamp and ligature. Both ovaries	. . .	4 ,,	Recovered	Health excellent in 1872	100
Ligature . .	12 ,,	4 ,,	Recovered	Married July, 1868—no child. Died of tuberculosis, July 1872	101
Ligature . .	20 ,,	8 ,,	Died, 4th day	Fibrinous clot in heart and pulmonary artery	102
Ligature . .	18 ,,	4 ,,	Died, 29th day	Chronic peritonitis	103
Clamp . .	17 ,,	4 ,,	Recovered	Husband died; married again; one child by second husband. Well in 1871	104
Clamp . .	11 ,,	4 ,,	Recovered	Well and single in 1872	105
Clamp . .	18 ,,	4 ,,	Recovered	Married May 1870; no children—swelling on right side of abdomen. Well in 1872	106

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
107	Mr. Carden, Worcester	1864 Oct.	44	Married	Parietal. Burst cyst
108	Dr. Ramsbotham	,, Nov.	42	Single	Parietal
109	Hospital	,, Nov.	59	Married	None
110	Dr. De Mussy	,, Nov.	49	Married	Omental. Both ovaries
111	Mr. Square, Plymouth	,, Nov.	45	Single	Parietal
112	Dr. Greenhalgh	,, Nov.	19	Single	None
113	Sir T. Watson	,, Nov.	51	Single	Omental and intestinal. Burst cyst
114	Hospital	,, Nov.	34	Single	None
115	Mr. Savory, Stoke Newington	,, Dec.	33	Married	Omental
116	Hospital	,, Dec.	21	Single	None
117	Hospital	,, Dec.	27	Single	None
118	Hospital	1865 Jan.	42	Single	None
119	Dr. Credé, Liepzig	,, Jan.	19	Single	Parietal and omental
120	Dr. Evans, Hertford	,, Jan.	54	Married	Parietal and omental
121	Mr. Wright, Nottingham	,, Feb.	27	Single	Parietal
122	Hospital	,, Feb.	24	Single	Parietal, pelvic and omental
123	Hospital	,, Feb.	50	Married	Parietal and omental
124	Mr. Forster, Daventry	,, March	36	Married	None
125	Hospital	,, March	25	Single	None
126	Hospital	,, April	31	Married	Omental
127	Hospital	,, April	41	Married	Parietal
128	Hospital	,, May	33	Married	Parietal and omental
129	Dr. Farre	,, May	38	Married	Parietal and omental
130	Hospital	,, June	56	Single	Parietal
131	Dr. Whitehead, Manchester	,, June	56	Married	Parietal, omental and intestinal. Both ovaries
132	Mr. Hodgson	,, June	34	Single	None
133	Mr. May, Crosby	,, June	54	Married	Parietal and omental
134	Dr. Beatty, Dublin	,, June	37	Married	Parietal and intestinal
135	Hospital	,, July	41	Married	Omental
136	Dr. Breslau, Zurich	,, July	45	Married	Parietal and omental
137	Hospital	,, July	41	Married	None
138	Hospital	,, July	55	Married	Parietal
139	Hospital	,, Aug.	24	Married	Omental. Pregnant uterus
140	Dr. Bullen	,, Oct.	46	Married	Parietal and omental
141	Dr. Allen, Leeds	,, Oct.	53	Married	None
142	Dr. Walker, Peterborough	,, Oct.	59	Married	Parietal and intestinal
143	Hospital	,, Oct.	34	Single	Parietal
144	Hospital	,, Nov.	42	Single	Parietal

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Ligature . .	26 pounds	5 inches	Died, 11th day	Septic peritonitis	107
Clamp . .	28 ,,	8 ,,	Recovered	No return	108
Clamp . .	20 ,,	4 ,,	Recovered	Well in 1872	109
Ligature . .	36 ,,	7 ,,	Recovered	Well in 1872	110
Clamp . .	16 ,,	5 ,,	Died, six weeks	Cancer	111
Clamp . .	15 ,,	4 ,,	Recovered	Married 1865. Girls born 1866, 1868, 1869; boy July 1871 — labours natural. Well in 1872	112
Clamp . .	50 ,,	10 ,,	Died, 3rd day	Exhaustion	113
Clamp . .	35 ,,	9 ,,	Recovered	Well and single in 1872	114
Clamp . .	20 ,,	5 ,,	Recovered	No return	115
Clamp . .	10 ,,	4 ,,	Died, 4th day	Septic peritonitis	116
Ligature . .	15 ,,	7 ,,	Recovered	Well and single in 1872	117
Clamp . .	28 ,,	7 ,,	Recovered	Well and single in 1872	118
Clamp . .	15 ,,	6 ,,	Recovered		119
Clamp . .	46 ,,	7 ,,	Recovered	Well in 1872	120
Clamp . .	33 ,,	7 ,,	Recovered	Well in 1872	121
Clamp . .	28 ,,	5 ,,	Recovered	Other ovary afterwards removed	122
Clamp . .	20 ,,	6 ,,	Died, 5th day	Peritonitis	123
Clamp . .	27 ,,	8 ,,	Recovered	Well in 1872	124
Clamp . .	32 ,,	5 ,,	Recovered	Married June 1869; two children—labours natural. Well in 1872	125
Clamp and ligature	45 ,,	20 ,,	Died, 27 hours	Exhaustion	126
Clamp . .	27 ,,	5 ,,	Recovered	Died in 1869 of scirrhus of rectum	127
Ligature . .	23 ,,	8 ,,	Recovered	No return	128
Clamp . .	27 ,,	5 ,,	Recovered	Well in 1872	129
Ligature . .	30 ,,	5 ,,	Recovered	Died of some other disease in spring of 1870	130
Ligature . .	23 ,,	7 ,,	Died, 30 hours	Exhaustion	131
Clamp . .	60 ,,	4 ,,	Recovered	Well in 1872; married in 1870. Husband dead—no child	132
Ligature . .	33 ,,	5 ,,	Died, 5th day	Septicæmia	133
Ligature . .	. . .	5 ,,	Recovered	Very well in 1872; no child since operation	134
Clamp . .	. . .	8 ,,	Died, 4th day	Peritonitis	135
Clamp . .	48 ,,	8 ,,	Recovered	Very well in 1872	136
Clamp . .	. . .	5 ,,	Recovered	No return	137
Clamp . .	75 ,,	5 ,,	Died, 9th day	Peritonitis	138
Clamp. Uterine ligatures	28 ,,	4 ,,	Recovered	Well in 1872	139
Clamp . .	. . .	5 ,,	Recovered	Health good in 1872; widow since operation	140
Ligature . .	24 ,,	5 ,,	Recovered	Very well in 1872	141
Ligature and cautery	. . .	5 ,,	Died, 46 hours	Exhaustion	142
Clamp . .	30 ,,	6 ,,	Recovered	Very well—married since operation; 'expects to be confined in July 1872'	143
Clamp . .	30 ,,	5 ,,	Recovered	Very well in 1872. Single; menses regular	144

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
145	Dr. Martin, Rochester	1865 Nov.	31	Single	None
146	Dr. Tapson, Clapham	,, Nov.	30	Single	Parietal and omental
147	Hospital	,, Nov.	41	Married	Parietal
148	Dr. Hope, Boulogne	,, Dec.	50	Married	Broad ligament. Both ovaries
149	Mr. Fuller	,, Dec.	35	Married	Parietal
150	Hospital	,, Dec.	45	Single	None
151	Hospital	,, Dec.	44	Single	None
152	Dr. Budd	1866 Jan.	25	Single	Parietal
153	Hospital	,, Jan.	20	Single	Parietal and omental
154	Mr. Earle, Brentwood	,, Jan.	29	Married	None
155	Hospital	,, Jan.	39	Married	Omental
156	Mr. Baker, Birmingham	,, Feb.	37	Single	None
157	Hospital	,, Feb.	32	Single	Parietal
158	Dr. West	,, Feb.	34	Married	Parietal, omental and intestinal
159	Hospital	,, March	26	Married	Parietal. Cyst suppurating
160	Mr. Carden, Worcester	,, March	31	Single	None. Burst cyst
161	Dr. Birkett	,, March	30	Single	Parietal, omental and mesenteric
162	Hospital	,, March	23	Single	Parietal
163	Hospital	,, March	24	Single	None
164	Dr. Symonds, Clifton	,, April	27	Single	None
165	Hospital	,, April	46	Married	Omental
166	Dr. Priestley	,, May	42	Married	Parietal and omental
167	Hospital	,, May	52	Married	Parietal and omental
168	Mr. Leggatt	,, May	32	Single	None
169	Dr. Bowles, Folkestone	,, May	57	Single	Parietal and omental
170	Mr. Woodman	,, June	24	Single	None
171	Mr. Roberts, Ruabon	,, July	50	Married	Parietal
172	Mr. Wrench, Baglow	,, July	25	Married	Parietal and omental
173	Hospital	,, July	45	Married	Parietal
174	Mr. Haynes, Walton	,, July	28	Married	Parietal, omental and intestinal
175	Mr. Yate, Godalming	,, July	30	Married	Parietal and omental
176	Dr. Budd, Clifton	,, July	32	Married	None
177	Dr. Drysdale, R.A.	,, July	39	Married	None
178	Hospital	,, Aug.	22	Single	None
179	Hospital	,, Aug.	59	Married	Parietal and intestinal
180	Dr. Woakes, Luton	,, Aug.	42	Single	Parietal
181	Dr. Playfair	,, Aug.	40	Married	None
182	Mr. Clifton, Islington	,, Aug.	53	Married	Parietal
183	Dr. Savage	,, Oct.	48	Single	Omental and intestinal
184	Hospital	,, Oct.	37	Married	Omental and intestinal
185	Dr. Arthur	,, Oct.	48	Married	Omental

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Ligature . .	. . .	5 inches	Recovered	Married March 1869. Boy still-born at 5 months, 1869; girl 1871—labours easy. Well in 1872	145
Ligature . .	28 pounds	5 ,,	Recovered	Died of pneumonia, March 1866	146
Clamp . .	. . .	4 ,,	Recovered	Had a child since operation	147
Ligature , .	34 ,,	5 ,,	Died, 22nd day	Peritonitis	148
Clamp and ligature	40 ,,	5 ,,	Recovered	Health good in 1872—no child since operation	149
Clamp . .	31 ,,	6 ,,	Recovered	Well and single in 1872	150
Clamp . .	24 ,,	5 ,,	Recovered	Died of cancer of rectum, Feb. 1867	151
Clamp . .	17 ,,	6 ,,	Recovered	Well and single in 1872	152
Clamp . .	22 ,,	4 ,,	Recovered	Married since	153
Ligature . .	16 ,,	4 ,,	Died, 7th day	Peritonitis and clot in heart	154
Clamp . .	9 ,,	8 ,,	Died, 12th day	Septicæmia—cancer	155
Clamp and ligature	52 ,,	6 ,,	Recovered	Well and single in 1872	156
Clamp . .	20 ,,	6 ,,	Recovered	Well and single in 1872	157
Clamp . .	7 ,,	4 ,,	Recovered	Well in 1872—no children	158
Clamp . .	8 ,,	5 ,,	Died, 25 hours	Pyæmic fever	159
Clamp . .	30 ,,	6 ,,	Died, 26 hours	Exhaustion	160
Ligature . .	24 ,,	5 ,,	Died, 35 hours	Peritonitis	161
Clamp . .	69 ,,	4 ,,	Died, 52 hours	Pulmonary embolism	162
Ligature . .	16 ,,	7 ,,	Recovered	Well and single in 1872	163
Clamp . .	16 ,,	7 ,,	Died, 4th day	Peritonitis	164
Clamp . .	14 ,,	8 ,,	Recovered	Health good in 1872	165
Clamp . .	25 ,,	5 ,,	Recovered	Health pretty good in 1872—no children	166
Clamp . .	25 ,,	8 ,,	Died, 4th day	Peritonitis	167
Ligature . .	16 ,,	5 ,,	Recovered	Very well; still single in 1872	168
Clamp . .	15 ,,	7 ,,	Recovered	Health good in 1872	169
Cautery . .	28 ,,	4 ,,	Recovered	Well and single in 1872	170
Cautery . .	23 ,,	4 ,,	Recovered	Health good in 1872	171
Cautery . .	15 ,,	7 ,,	Died, 4th day	Septicæmia	172
Cautery and ligature	17 ,,	7 ,,	Recovered	Well in 1872; husband dead	173
Clamp . .	28 ,,	8 ,,	Recovered	Well in 1872	174
Ligature . .	23 ,,	4 ,,	Recovered	Girl born 1869; labours natural. Well in 1872	175
Clamp . .	13 ,,	6 ,,	Recovered	Well in 1872; no child	176
Clamp . .	25 ,,	5 ,,	Recovered	Child born March 1868. Well in 1872	177
Clamp . .	. . .	4 ,,	Recovered	Married 1869; girls born 1870 and 1871 — labours natural. Well in 1872	178
Clamp . .	. . .	5 ,,	Recovered	Weak; otherwise quite well in 1872	179
Clamp . .	21 ,,	4 ,,	Recovered	Well and single in 1872	180
Cautery and ligature	33 ,,	7 ,,	Convalescent	Died a month after of chronic peritonitis from an accident	181
Clamp . .	28 ,,	5 ,,	Recovered	Remained well till 1871, when she died of some other disease	182
Clamp . .	28 ,,	5 ,,	Recovered	Well in 1872	183
Clamp . .	29 ,,	9 ,,	Recovered	Well in 1871	184
Cautery . .	18 ,,	7 ,,	Died, 5th day	Peritonitis	185

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
186	Dr. Kingsley, Stratford-on-Avon	1866 Oct.	43	Married	Broad ligament
187	Mr. Johnson, Croydon	,, Oct.	21	Single	None
188	Dr. Gream	,, Oct.	28	Single	None
189	Dr. Hassall, Richmond	,, Oct.	32	Married	Omental
190	Hospital	,, Nov.	37	Married	None
191	Dr. Monckton, Maidstone	,, Nov.	50	Married	None
192	Mr. Freer, Stourbridge	,, Nov.	36	Single	None
193	Dr. Traill	,, Dec.	52	Married	Parietal and omental
194	Hospital	,, Dec.	31	Married	Parietal and omental
195	Mr. Turner	,, Dec.	55	Married	Parietal, omental and intestinal
196	Mr. Love, Wimbledon	,, Dec.	28	Married	Parietal, omental and intestinal
197	Hospital	1867 Jan.	34	Married	None
198	Dr. Gream	,, Feb.	34	Married	None
199	Dr. Farre	,, Feb.	39	Married	Omental
200	Dr. Farre	,, March	38	Married	None
201	Mr. Illingworth	,, March	40	Single	None
202	Mr. Wakefield	,, March	27	Single	None
203	Hospital	,, March	47	Married	Parietal
204	Dr. Hingston, Plymouth	,, March	43	Single	None
205	Hospital	,, March	35	Single	Extensive
206	Mr. Shipman, Grantham	,, April	43	Married	Parietal
207	Dr. Graily Hewitt	,, April	43	Married	Parietal
208	Hospital	,, May	31	Single	Parietal
209	Hospital	,, May	29	Married	Parietal
210	Mr. Marsack, Tunbridge Wells	,, May	40	Married	None
211	Hospital	,, May	53	Married	None
212	Mr. C. Reade, Clifton	,, May	37	Single	Ruptured adherent cyst
213	Hospital	,, June	33	Widow	None
214	Mr. Tapson	,, June	57	Single	Parietal, omental and intestinal
215	Hospital	,, June	52	Married	Parietal
216	Dr. Burrows	,, June	35	Married	None
217	Dr. Southey	,, June	39	Single	Parietal
218	M. Nélaton	,, June	42	Married	Omental
219	Dr. Barnes	,, June	38	Single	Parietal and intestinal
220	Hospital	,, July	50	Single	Parietal
221	Hospital	,, July	56	Married	None
222	Dr. Priestley	,, July	59	Widow	None
223	Hospital	,, July	51	Married	None

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Cautery and ligature	36 pounds	6 inches	Recovered	Health good in 1872	186
Cautery and ligature	20 ,,	6 ,,	Recovered	Married 1869; had miscarriage 1871. Well in 1872	187
Clamp . .	14 ,,	5 ,,	Recovered	Well and single in 1872	188
Ligature . .	44 ,,	9 ,,	Died, 42 hours	Peritonitis	189
Clamp . .	24 ,,	4 ,,	Recovered	Health very good in 1872: widow since operation	190
Clamp . .	23 ,,	4 ,,	Recovered	Very well in 1872; slight hernial protrusion in cicatrix	191
Clamp . .	14 ,,	4 ,,	Recovered	Married since operation; girl born 1869 — labour lingering. Well in 1872	192
Clamp and ligature	32 ,,	6 ,,	Recovered	Very well in 1872	193
Clamp . .	22 ,,	10 ,,	Died, 33 hours	Peritonitis	194
Clamp . .	15 ,,	6 ,,	Died, 76 hours	Septicæmia	195
Clamp . .	28 ,,	5 ,,	Died, 5th day	Pyæmic fever	196
Cautery and ligature	12 ,,	4 ,,	Died, 4th day	Peritonitis	197
Clamp . .	17 ,,	5 ,,	Recovered	Died a year afterwards of renal disease	198
Cautery and ligature	25 ,,	7 ,,	Recovered	Well in 1872	199
Clamp . .	28 ,,	6 ,,	Recovered	Boys born 1868 and 1870—labours natural. Well in 1872	200
Cautery . .	14 ,,	5 ,,	Recovered	Well in 1872	201
Cautery and ligature	16 ,,	5 ,,	Recovered	Married 1871; one child born May 1872—labour natural	202
Clamp . .	25 ,,	5 ,,	Recovered	Health good in 1872	203
Cautery . .	14 ,,	6 ,,	Recovered	Well and single in 1872	204
Ligature returned . .	23 ,,	6 ,,	Died, 20th day	Obstructed intestine	205
Clamp . .	32 ,,	5 ,,	Recovered	Very well in 1872	206
Clamp . .	14 ,,	6 ,,	Recovered	Died in 1870 of anæmia	207
Clamp . .	37 ,,	5 ,,	Recovered	Well and single in 1872	208
Clamp . .	38 ,,	5 ,,	Recovered	Well in 1872	209
Clamp , .	18 ,,	5 ,,	Recovered	Child born 1868. Well in 1872	210
Clamp . .	14 ,,	5 ,,	Recovered	Died July 1871, of cardiac disease, with dropsy	211
Clamp . .	42 ,,	5 ,,	Recovered	Very well and single in 1872	212
Clamp . .	52 ,,	4 ,,	Recovered	No return	213
Clamp . .	15 ,,	5 ,,	Died, 42 hours	Exhaustion	214
Clamp . .	17 ,,	4 ,,	Recovered	Well in 1872	215
Clamp . .	16 ,,	5 ,,	Recovered	Well in 1872	216
Clamp . .	26 ,,	5 ,,	Recovered	Pretty good health in 1872. Single	217
Clamp . .	28 ,,	8 ,,	Recovered	Very well in 1872	218
Clamp . .	19 ,,	5 ,,	Recovered	Health excellent in 1872. Still single	219
Clamp . .	27 ,,	5 ,,	Recovered	Died Dec. 1868 of delirium tremens	220
Clamp . .	5 ,,	4 ,,	Recovered	Well in 1872	221
Clamp . .	40 ,,	6 ,,	Recovered	Very well in 1872	222
Clamp . .	13 ,,	4 ,,	Died, 8th day	Peritonitis	223

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesion
224	Hospital	1867 July	53	Married	Parietal and omental
225	Hospital	,, Aug.	25	Married	Pelvic
226	Dr. Symonds, Clifton	,, Aug.	41	Widow	None
227	Dr. Grasemann	,, Aug.	25	Single	None
228	Mr. Franks, Sevenoaks	,, Aug.	27	Single	Parietal
229	Mr. Woolmer	,, Oct.	27	Married	Parietal
230	Dr. Bowles, Folkestone	,, Oct.	52	Married	None
231	Dr. Budd, Clifton	,, Oct.	56	Single	Parietal
232	Hospital	,, Oct.	40	Married	Omental
233	Dr. West	,, Oct.	40	Single	None
234	Hospital	,, Nov.	42	Single	Parietal
235	Hospital	,, Nov.	46	Married	Parietal and omental
236	Dr. Whitehead, Manchester	,, Nov.	51	Married	Omental
237	Mr. Kesteven	,, Nov.	34	Married	Parietal
238	Hospital	,, Nov.	23	Single	Parietal and omental
239	Hospital	,, Nov.	30	Married	Parietal
240	Hospital	,, Dec.	25	Single	None
241	Hospital	,, Dec.	51	Married	Intestinal
242	Mr. E. P. Young	,, Dec.	40	Single	Parietal and omental
243	Dr. De Mussy	,, Dec.	41	Single	Parietal
244	Hospital	,, Dec.	23	Single	Parietal and omental
245	Hospital	1868 Jan.	22	Single	None
246	Hospital	,, Jan.	48	Married	None
247	Dr. Cleveland	,, Jan.	25	Single	Parietal
248	Hospital	,, Jan.	34	Single	None
249	Hospital	,, Jan.	32	Married	Parietal and omental
250	Hospital	,, Feb.	33	Single	Intestinal
251	Hospital	,, Feb.	30	Single	Parietal
252	Mr. Smith, Battle	,, Feb.	50	Married	Parietal
253	Hospital	,, March	33	Single	None
254	Br. Buckall, Chichester	,, March	34	Married	Parietal and omental
255	Mr. Morris, Edmonton	,, March	54	Married	None
256	Hospital	,, March	38	Widow	Omental
257	Hospital	,, March	28	Single	Omental
258	Mr. Nunn	,, March	34	Married	Parietal, omental and intestinal
259	Mr. Crompton, Birmingham	,, March	62	Married	None

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Clamp . .	41 pounds	6 inches	Died, 8th day	Peritonitis	224
Cautery . .	12 ,,	4 ,,	Recovered	Very well in 1872. Boys born 1869, 1870, and 1872—labours natural	225
Cautery . .	11 ,,	4 ,,	Recovered	Very well in 1872.	226
Cautery . .	13 ,,	4 ,,	Recovered	Well and single in 1872	227
Cautery . .	16 ,,	5 ,,	Recovered	Well in 1870	228
Cautery and ligatures	40 ,,	5 ,,	Died, 51 hours	Septicæmia	229
Cautery and ligatures	18 ,,	4 ,,	Recovered	No return	230
Cautery . .	6 ,,	4 ,,	Recovered	Well in 1872	231
Clamp . .	32 ,,	5 ,,	Recovered	Very well in 1872. Husband dead. No child since operation	232
Cautery and ligatures	18 ,,	4 ,,	Recovered	Well and single in 1872	233
Clamp . .	30 ,,	5 ,,	Recovered	Well and single in 1872	234
Clamp . .	15 ,,	5 ,,	Recovered	Well in 1872	235
Ligature . .	9 ,,	7 ,,	Died, 13th day	Cardiac embolism and carcinoma	236
Clamp . .	20 ,,	5 ,,	Recovered	Well in 1872. Has had three children since operation	237
Clamp . .	19 ,,	5 ,,	Recovered	No return	238
Clamp . .	10 ,,	5 ,,	Recovered	Boy born 1869—labour lingering but natural. Well in 1872	239
Clamp . .	10 ,,	4 ,,	Recovered	Well and single in 1872	240
Cautery . .	11 ,,	5 ,,	Recovered	Very well in 1872	241
Clamp . .	16 ,,	5 ,,	Recovered	Very well and single in 1872	242
Clamp . .	24 ,,	5 ,,	Recovered	Alive and well in 1872	243
Clamp . .	21 ,,	7 ,,	Recovered	Very well. Married Jan. 1872, and was pregnant in May 1872	244
Clamp . .	26 ,,	4 ,,	Recovered	Pretty well in 1872; suffers from dysmenorrhœa	245
Cautery and ligatures	14 ,,	4 ,,	Died, 5th day	Exhaustion	246
Cautery and ligatures	11 ,,	5 ,,	Recovered	Health good—rather dyspeptic. Married 1870. Girls born 1870 and 1872—labours natural	247
Clamp . .	25 ,,	5 ,,	Recovered	Health good in 1872. Married June 1869; no child	248
Clamp . .	46 ,,	7 ,,	Recovered		249
Ligature . .	11 ,,	5 ,,	Died, 4th day	Peritonitis	250
Clamp . .	16 ,,	5 ,,	Recovered	Married 1870—had twins 1871—labour natural. Well in 1872	251
Clamp . .	21 ,,	5 ,,	Recovered	Health good in 1872; small hernia through cicatrix	252
Clamp . .	19 ,,	6 ,,	Recovered	Married June 1868—had child. Well in 1872	253
Clamp . .	20 ,,	5 ,,	Recovered	Health good in 1869. Girl born 1870—labour natural	254
Clamp . .	19 ,,	5 ,,	Recovered	Well in 1872	255
Clamp . .	28 ,,	5 ,,	Recovered	No return	256
Clamp . .	19 ,,	5 ,,	Recovered	Well in 1872	257
Ligature . .	50 ,,	6 ,,	Died, 48 hours	Exhaustion	258
Clamp . .	20 ,,	3 ,,	Recovered	Well in 1872	259

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
260	Dr. Tilt	1868 March	50	Single	Parietal
261	Hospital	,, April	39	Widow	Parietal
262	Hospital	,, April	20	Single	Parietal and omental.
263	Hospital	,, April	42	Married	Parietal
264	Dr. E. Ellis	,, April	54	Single	Parietal and omental
265	Hospital	,, May	50	Widow	Parietal
266	Hospital	,, May	39	Widow	None. Ruptured cyst
267	Mr. Mason, Surbiton	,, May	43	Married	Parietal, intestinal and pelvic
268	Dr. Pocock, Brixton	,, May	24	Married	Parietal and omental
269	Hospital	,, May	32	Single	None
270	Hospital	,, June	23	Single	None
271	Hospital	,, June	42	Married	None
272	Dr. Redlich, Moscow	,, June	57	Widow	Parietal
273	Hospital	,, June	49	Single	Parietal
274	Hospital	,, July	45	Widow	Parietal and omental
275	Hospital	,, July	27	Married	None
276	Hospital	,, July	35	Married	Parietal and omental
277	Hospital	,, July	52	Married	Parietal
278	Mr. Wright, Clapham Road	,, Aug.	48	Single	Parietal
279	Hospital	,, Oct.	46	Single	Parietal
280	Dr. J. Clarke	,, Oct.	41	Married	None
281	Hospital	,, Oct.	47	Widow	Parietal and omental
282	Hospital	,, Oct.	16	Single	Parietal and omental
283	Dr. Morris	,, Oct.	39	Single	Parietal and omental
284	Hospital	,, Oct.	35	Single	Parietal
285	Dr. Grenser, Dresden	,, Oct.	28	Single	None
286	Dr. Roberts, Manchester	,, Oct.	36	Married	Omental
287	Hospital	,, Oct.	53	Married	Parietal, omental and intestinal
288	Hospital	,, Oct.	45	Widow	Parietal and omental.
289	Dr. West	,, Nov.	31	Married	Parietal and omental.
290	Hospital	,, Nov.	25	Single	None
291	Mr. Oldham, Brighton	,, Nov.	39	Married	Parietal and omental.
292	Mr. Keele, Southampton	,, Nov.	43	Single	None
293	Dr. Ransom, Nottingham	,, Nov.	42	Married	None
294	Dr. Davies, Holywell	,, Nov.	41	Married	None

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Clamp . .	7 pounds	4 inches	Recovered	Well in 1871	260
Clamp . .	18 ,,	4 ,,	Recovered	Very well in 1872	261
Clamp . .	32 ,,	4 ,,	Recovered	Well and single in 1872	262
Clamp . .	21 ,,	4 ,,	Recovered	Very well in 1872	263
Pins and ligatures — both ovaries removed	30 ,,	5 ,,	Died, 80 hours	Peritonitis	264
Clamp and ligatures — both ovaries removed	32 ,,	5 ,,	Recovered	Health perfect in 1872	265
Clamp . .	25 ,,	5 ,,	Recovered	Died of cardiac dropsy, Aug. 1869	266
Ligatures .	24 ,,	6 ,,	Died, 2 hours	Collapse	267
Clamp . .	26 ,,	5 ,,	Recovered	Very well in 1872; no child since operation, but husband died	268
Clamp . .	17 ,,	5 ,,	Recovered	Girl born 1869. Well in 1872	269
Clamp . .	20 ,,	4 ,,	Recovered	Well and single in 1872	270
Clamp . .	13 ,,	4 ,,	Recovered	No return	271
Clamp . .	31 ,,	5 ,,	Recovered	Well in 1872	272
Clamp . .	50 ,,	4 ,,	Recovered	Well and single in 1872	273
Clamp . .	9 ,,	5 ,,	Recovered	No return	274
Clamp . .	15 ,,	4 ,,	Recovered	Very well in 1872. Girls born 1869 and 1870—labours natural	275
Clamp . .	28 ,,	5 ,,	Recovered	Very well in 1872. Girl born 1870—labour easier than previous ones	276
Clamp . .	12 ,,	4 ,,	Recovered	Well in 1872	277
Clamp . .	26 ,,	5 ,,	Died, 3rd day	Septicæmia	278
Clamp . .	17 ,,	5 ,,	Recovered	Well and single in 1872	279
Clamp . .	15 ,,	4 ,,	Recovered	Very well in 1872. Boys born 1869 and 1871—labours natural	280
Clamp . .	31 ,,	5 ,,	Recovered	Health good in 1872	281
Clamp . .	26 ,,	8 ,,	Recovered	Well and single in 1872	282
Clamp . .	19 ,,	5 ,,	Recovered	Very weak from pulmonary disease, dating prior to operation. Single in 1872	283
Ligature . .	9 ,,	4 ,,	Died, 42 hours	Septicæmia	284
Cautery . .	56 ,,	4 ,,	Recovered	Well in 1872	285
Clamp . .	15 ,,	4 ,,	Recovered	Very well in 1872; no child since operation	286
Ligatures — both ovaries removed	23 ,,	5 ,,	Died, 23 hours	Shock	287
Clamp . .	33 ,,	6 ,,	Died, 30 hours	Exhaustion	288
Clamp and ligatures — both ovaries removed	58 ,,	6 ,,	Died, 29 hours	Exhaustion	289
Clamp . .	22 ,,	4 ,,	Died, 6th day	Peritonitis	290
Clamp . .	33 ,,	6 ,,	Died, 45 hours	Collapse	291
Clamp . .	36 ,,	5 ,,	Died, 34 hours	Exhaustion	292
Ligatures .	30 ,,	4 ,,	Died, 40 hours	Collapse	293
Clamp . .	13 ,,	4 ,,	Recovered	Very well in 1872	294

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
295	Hospital	1868 Dec.	43	Single	Parietal
296	Hospital	,, Dec.	46	Married	Parietal
297	Dr. A. Farre	,, Dec.	22	Single	None
298	Dr. Attenburrow, Jersey	,, Dec.	46	Single	Parietal
299	Hospital	1869 Jan.	25	Single	None
300	Sir T. Watson, Bart	,, Jan.	28	Single	Parietal and omental
301	Hospital	,, Jan.	49	Married	Parietal. Ruptured cyst
302	Hospital	,, Feb.	41	Married	Parietal
303	Mr. Ewen, Wisbeach	,, Feb.	25	Single	None
304	Dr. Jackson, Oxford	,, Feb.	49	Married	Parietal
305	Dr. Gream	,, Feb.	55	Single	Parietal and pelvic
306	Hospital	,, Feb.	29	Married	Parietal, omental, and intestinal
307	Hospital	,, Feb.	48	Widow	None
308	Hospital	,, Feb.	49	Married	Parietal & pelvic. Both ovaries
309	Hospital	,, March	40	Married	Parietal
310	Hospital	,, March	59	Married	None. Burst cyst
311	Dr. Leadam	,, April	38	Widow	Omental
312	Hospital	,, April	54	Single	Parietal and omental
313	Hospital	,, April	35	Single	Parietal and mesenteric
314	Dr. Oldham	,, May	25	Single	None
315	Mr. Squire	,, May	20	Single	None. Burst cyst
316	Mr. Stevens, Christchurch	,, May	36	Single	Parietal and omental
317	Mr. Livy, Bolton	,, May	30	Single	None
318	Dr. Ridley, Canada	,, May	38	Married	None
319	Hospital	,, May	22	Single	None. Both ovaries
320	Dr. Braxton Hicks	,, May	39	Married	Omental & pelvic. Both ovaries
321	Sir W. Jenner, Bart.	,, June	27	Married	None
322	Hospital	,, June	24	Married	Parietal & pelvic. Both ovaries
323	Dr. Nethe, Neuhaldensleben	,, June	42	Married	Intestinal
324	Dr. Fitzpatrick	,, June	30	Single	Omental. Burst cyst
325	Dr. Quain	,, June	50	Single	Parietal and pelvic. Burst cyst
326	Dr. Burrows	,, June	47	Married	Omental and intestinal
327	Dr. Greenhalgh	,, June	48	Married	Omental & parietal. Burst cyst
328	Hospital	,, June	41	Married	None
329	Hospital	,, June	27	Married	Parietal and omental
330	Mr. Bateman	,, Aug.	36	Married	Omental. Burst cyst. Pregnancy
331	Mr. Corner, Poplar	,, Aug.	30	Single	Parietal, omental and intestinal
332	Mr. Symonds, Oxford	,, Aug.	54	Single	None
333	Mr. Clarke, Huddersfield	,, Sept.	23	Single	None

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Clamp . .	23 pounds	8 inches	Recovered	Well in 1872	295
Ligature . .	7 ,,	5 ,,	Died, 56 hours	Peritonitis	296
Clamp . .	18 ,,	4 ,,	Died, 57 hours	Pneumonic congestion and embolism	297
Clamp . .	22 ,,	6 ,,	Died, 54 hours	Peritonitis	298
Cautery . .	23 ,,	5 ,,	Recovered	No return	299
Clamp and ligatures . .	28 ,,	7 ,,	Recovered	Well in 1872	300
Pins and ligature . .	27 ,,	6 ,,	Recovered	Died Oct. 1869 of some other disease	301
Clamp . .	49 ,,	6 ,,	Recovered	Health excellent in 1872	302
Clamp . .	12 ,,	4 ,,	Recovered	Very well in 1872—still single	303
Clamp . .	21 ,,	7 ,,	Recovered	Well in 1872	304
Clamp and ligatures . .	22 ,,	7 ,,	Died, 26 hours	Cardiac embolism	305
Ligature . .	39 ,,	7 ,,	Died, 4th day	Peritonitis	306
Clamp . .	41 ,,	4 ,,	Recovered	No return	307
Clamp and ligature . .	19 ,,	5 ,,	Recovered	No return	308
Pins and ligature . .	36 ,,	9 ,,	Died, 50 hours	Coma from disease of heart	309
Clamp . .	11 ,,	6 ,,	Recovered	No return	310
Clamp . .	13 ,,	5 ,,	Recovered	Very well in 1872—husband dead	311
Clamp . .	12 ,,	5 ,,	Died, 5th day	Intestinal obstruction	312
Clamp . .	13 ,,	5 ,,	Died, 7th day	Peritonitis	313
Clamp . .	18 ,,	4 ,,	Recovered	Well and single in 1872	314
Clamp . .	13 ,,	5 ,,	Recovered	Well and single in 1872	315
Clamp . .	40 ,,	5 ,,	Died, 4th day	Peritonitis	316
Clamp . .	9 ,,	4 ,,	Died, 5th day	Peritonitis	317
Cautery . .	13 ,,	4 ,,	Recovered	Well in 1872	318
Clamp and ligature . .	11 ,,	4 ,,	Recovered	Well in 1872. Stout and florid	319
Clamp and ligature . .	20 ,,	6 ,,	Recovered	Died April 1871. Cardiac dropsy	320
Clamp . .	19 ,,	5 ,,	Recovered	Well in 1872	321
Ligatures .	22 ,,	8 ,,	Died, 28 hours	Collapse	322
Clamp . .	26 ,,	6 ,,	Recovered	Health very good in 1872	323
Clamp . .	13 ,,	4 ,,	Recovered	Died of pleurisy, Dec. 1869	324
Clamp . .	9 ,,	5 ,,	Died, 17 hours	Peritonitis	325
Clamp . .	26 ,,	6 ,,	Recovered	Convalescent at present from attack of hemiplegia which occurred in July 1871—widow	326
Clamp . .	23 ,,	6 ,,	Died, 3rd day	Peritonitis	327
Ligature . .	18 ,,	4 ,,	Died, 3rd day	Obstructed intestine	328
Clamp . .	23 ,,	6 ,,	Recovered	Child (boy) born Feb. 1870	329
Clamp . .	37 ,,	7 ,,	Recovered	Child born, Feb. 1870. Died of cancer of uterus, March 1871	330
Clamp . .	22 ,,	6 ,,	Recovered	Died, Dec. 1869, of diffuse carcinoma	331
Clamp . .	22 ,,	5 ,,	Recovered	Well in 1872	332
Clamp . .	6 ,,	4 ,,	Recovered	Married 1870. Boy born 1871—labour easy	333

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
334	Hospital	1869 Oct.	32	Single	None
335	Dr. Gervis	,, Oct.	37	Single	None
336	Hospital	,, Oct.	43	Married	None. Burst cyst
337	Hospital	,, Nov.	26	Single	Parietal and omental
338	Dr. Case, Fareham	,, Nov.	18	Single	None
339	Dr. Rayner, Stockport	,, Nov.	31	Married	None
340	Hospital	,, Nov.	46	Married	Parietal and intestinal
341	Hospital	,, Nov.	29	Single	Intestinal
342	Hospital	,, Dec.	35	Single	None
343	Dr. Ramskill	,, Dec.	54	Married	Omental
344	Hospital	,, Dec.	51	Married	Omental and intestinal
345	Mr. Crompton, Birmingham	1870 Jan.	39	Single	Pelvic
346	Dr. Symonds, Clifton	,, Jan.	48	Single	Parietal
347	Hospital	,, Jan.	42	Married	Parietal and omental
348	Dr. West	Jan.	34	Single	To cæcum
349	Hospital	,, Jan.	24	Single	Omental and parietal
350	Hospital	,, Feb.	47	Widow	Parietal
351	Sir J. Alderson	,, Feb.	40	Single	None
352	Mr. Cockcroft, Darlington.	,, Feb.	28	Married	None
353	Dr. Priestley	,, Feb.	20	Single	None
354	Hospital	,, March	22	Single	Omental
355	Sir W. Jenner, Bart.	,, March	63	Widow	Omental
356	Hospital	,, March	48	Married	None
357	Hospital	,, April	37	Married	None
358	Mr. Beckingscale, Newport	,, April	53	Married	Omental and intestinal
359	Dr. Evans, Birmingham	,, April	61	Single	Omental, intestinal, and parietal
360	Hospital	,, April	32	Married	Omental
361	Mr. Tweddell, Houghton-le-Spring	,, April	46	Married	None
362	Hospital	,, April	22	Married	Omental
363	Sir W. Gull, Bart.	,, May	53	Widow	None
364	Mr. Barkway, Bungay	,, May	42	Married	Parietal and omental.
365	Hospital	,, May	45	Married	Parietal
366	Hospital	,, May	27	Single	Parietal and omental.
367	Dr. Kinnear, Malmesbury	,, May	29	Single	None
368	Dr. Miller, Blackheath	,, May	25	Married	Parietal
369	Hospital	,, May	47	Married	Parietal and omental
370	Hospital	,, June	33	Married	None

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Clamp . .	17 pounds	4 inches	Recovered	No return	334
Clamp . .	6 ,,	4 ,,	Recovered	Well in 1872	335
Clamp and ligature . .	20 ,,	6 ,,	Recovered	Died June 1872. Re-growth of ovarian tumour. Amyloid kidneys	336
Clamp . .	21 ,,	4 ,,	Recovered	Well and single in 1872	337
Clamp . .	16 ,,	3 ,,	Recovered	Well and single in 1872	338
Clamp . .	21 ,,	4 ,,	Recovered	Health fair in 1872—no child since operation	339
Clamp . .	24 ,,	6 ,,	Died, 26 hours	Collapse	340
Ligature . .	19 ,,	4 ,,	Recovered	Well and single in 1872	341
Clamp and ligature . .	14 ,,	4 ,,	Recovered	Health excellent in 1872—still single.	342
Clamp . .	16 ,,	4 ,,	Recovered	Very well in 1872	343
Cautery and ligature .	13 ,,	6 ,,	Recovered	Well in 1871	344
Clamp and ligature . .	13 ,,	5 ,,	Recovered	Married, Oct 1870 — child born Oct. 1871	345
Clamp . .	24 ,,	5 ,,	Recovered	Well and single in 1872	346
Clamp . .	23 ,,	5 ,,	Recovered	Very well in 1872	347
Clamp and ligature. Both ovaries . .	12 ,,	3 ,,	Recovered	Well in 1872	348
Clamp . .	33 ,,	4 ,,	Died, 4th day	Peritonitis	349
Clamp and ligature . .	23 ,,	5 ,,	Died, 39 hours	Peritonitis	350
Clamp . .	16 ,,	4 ,,	Recovered	Health very good, married June 1871	351
Clamp . .	28 ,,	4 ,,	Recovered	Health excellent in 1872	352
Clamp and ligature. Both ovaries . .	18 ,,	4 ,,	Died, 5th day	Peritonitis	353
Clamp . .	33 ,,	8 ,,	Recovered	Very well, still single	354
Ligature . .	42 ,,	6 ,,	Died, 6th day	Septicæmia	355
Clamp . .	11 ,,	4 ,,	Died, 4th day	Septicæmia	356
Clamp . .	17 ,,	6 ,,	Recovered	Health very good in 1872	357
Clamp and ligature . .	35 ,,	6 ,,	Died, 18th day	Exhaustion	358
Clamp . .	33 ,,	6 ,,	Recovered	Well and single in 1872	359
Clamp . .	29 ,,	6 ,,	Recovered	Health good in 1872, has had several miscarriages both before and since operation	360
Clamp . .	22 ,,	5 ,,	Recovered	Well in 1872	361
Ligature . .	6 ,,	5 ,,	Recovered	No return	362
Clamp . .	21 ,,	5 ,,	Recovered	Well in 1872	363
Clamp . .	18 ,,	5 ,,	Recovered	Health good in 1872	364
Clamp . .	56 ,,	6 ,,	Died, 3rd day	Hyperpyrexia	365
Ligature . .	11 ,,	5 ,,	Recovered	Well and single in 1872	366
Clamp . .	22 ,,	5 ,,	Recovered	Well and single in 1872	367
Clamp . .	17 ,,	5 ,,	Recovered	Well in 1872	368
Clamp . .	27 ,,	6 ,,	Recovered	Health very good in 1872	369
Clamp . .	15 ,,	5 ,,	Died, 32 hours	Pneumonic congestion	370

No.	Medical Attendant	Date	Age	Condition	Adhesions
371	Dr. Welch, Southampton	1870 June	34	Married	None
372	Dr. Collyer, Enfield	„ June	28	Married	None
373	Dr. Unna, Hamburgh	„ June	44	Married	Omental and pelvic
374	Hospital	„ June	40	Single	None
375	Hospital	„ June	32	Married	Parietal
376	Hospital	„ July	32	Married	Parietal and omental
377	Mr. Pyne, Royston	„ July	42	Married	None
378	Hospital	„ July	38	Single	Omental
379	Dr. Cole, Bath	„ July	27	Single	None
380	Dr. West	„ Aug.	18	Single	Omental
381	Dr. Swain, Birmingham	„ Aug.	29	Single	None
382	Hospital	„ Aug.	31	Married	Omental
383	Mr. Belcher, Burton	„ Aug.	26	Single	None
384	Mr. Godson	„ Aug.	43	Widow	Parietal
385	Hospital	„ Oct.	24	Single	Omental
386	Mr. Roberts, Portmadoc	„ Oct.	53	Married	None
387	Dr. Orsborne, Bittern	„ Oct.	59	Widow	Parietal
388	Dr. Smith, Weymouth	„ Oct.	52	Single	None
389	Hospital	„ Oct.	36	Married	Parietal
390	Mr. Gibson, Norwich	„ Oct.	63	Single	Parietal
391	Hospital	„ Oct.	53	Married	None. Burst cyst
392	Hospital	„ Oct.	42	Married	Parietal
393	Hospital	„ Nov.	30	Single	None
394	Dr. Prince	„ Nov.	50	Single	Parietal
395	Dr. Smith, Weymouth	„ Nov.	51	Widow	None
396	Hospital	„ Nov.	23	Single	Parietal and omental
397	Mr. Morris, Edmonton	„ Nov.	50	Married	None. Burst cyst
398	Hospital	„ Dec.	65	Married	Parietal, omental, and intestinal
399	Mr. Goddard	„ Dec.	29	Married	None. Pregnant
400	Dr. Thetford	„ Dec.	34	Married	Parietal. Burst cyst
401	Mr. Yate, Godalming	1871 Jan.	52	Married	Parietal
402	Mr. Aikin	„ Jan.	37	Married	Parietal
403	Hospital	„ Jan.	38	Married	Omental and mesenteric
404	Dr. Druitt	„ Jan.	63	Single	None
405	Dr. Webb	„ Jan.	58	Married	Parietal. Cyst suppurating
406	Dr. Sieveking	„ Feb.	50	Single	None. Burst cyst
407	Hospital	„ Feb.	25	Married	Parietal
408	Dr. Chepmall	„ Feb.	27	Single	Parietal
409	Dr. Webb	„ Feb.	21	Single	None

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Clamp . .	28 pounds	5 inches	Recovered	Health good in 1872, no child since operation	371
Clamp . .	30 ,,	7 ,,	Recovered	Very well in 1872—girl born July 1871	372
Ligature . .	6 ,,	7 ,,	Recovered	Health perfect in 1872	373
Clamp . .	12 ,,	6 ,,	Recovered	Well and single in 1872	374
Clamp . .	7 ,,	6 ,,	Recovered	No return	375
Clamp . .	22 ,,	6 ,,	Recovered	Health good in 1872, husband dead	376
Clamp . .	28 ,,	5 ,,	Recovered	Health good in 1872	377
Clamp and ligature. Both ovaries. .	16 ,,	5 ,,	Died, 4th day	Peritonitis	378
Clamp . .	10 ,,	5 ,,	Recovered	Very well and single in 1872	379
Clamp . .	16 ,,	5 ,,	Recovered	Well and single in 1872	380
Clamp . .	21 ,,	4 ,,	Recovered	Very well and single in 1872	381
Clamp . .	21 ,,	5 ,,	Recovered	Health good in 1872, husband dead	382
Clamp . .	25 ,,	5 ,,	Recovered	No return	383
Clamp . .	29 ,,	5 ,,	Recovered	Health good in 1872	384
Clamp . .	26 ,,	5 ,,	Recovered	Well and single in 1872	385
Clamp . .	13 ,,	5 ,,	Recovered	Very well in 1872	386
Clamp . .	11 ,,	5 ,,	Recovered	Health very good in 1872	387
Clamp and ligature. Both ovaries. .	24 ,,	5 ,,	Recovered	Well and single in 1872	388
Clamp . .	11 ,,	5 ,,	Recovered	Very well. Twins, girl and boy, born July 1872.	389
Clamp . .	26 ,,	5 ,,	Recovered	Well and single in 1872	390
Clamp . .	44 ,,	5 ,,	Died, 35 hours	Exhaustion	391
Clamp . .	47 ,,	5 ,,	Recovered	Health excellent in 1872	392
Clamp . .	7 ,,	5 ,,	Recovered	No return	393
Clamp . .	. . .	5 ,,	Recovered	Died of bronchitis, May 1871	394
Clamp . .	23 ,,	5 ,,	Recovered	Health excellent in 1872	395
Clamp . .	7 ,,	5 ,,	Recovered	Perfectly well in 1872	396
Ligature . .	. . .	5 ,,	Recovered	At end of 1871 cicatrix gave, colloid fluid escaped, and continued till she died early in 1872	397
Clamp . .	66 ,,	8 ,,	Recovered	Very well in 1872	398
Clamp . .	15 ,,	5 ,,	Recovered	Very well in 1872. Child born seven months after operation	399
Clamp . .	28 ,,	5 ,,	Recovered	Well in 1872	400
Clamp . .	17 ,,	5 ,,	Recovered	Health very fair in 1872	401
Clamp and ligature . .	15 ,,	5 ,,	Recovered	Well and pregnant in 1872	402
Clamp and ligature . .	6 ,,	5 ,,	Recovered	Health very fair in 1872. Asthma of long standing.	403
Ligature . .	20 ,,	5 ,,	Recovered	Well and single in 1872	404
Clamp . .	19 ,,	5 ,,	Recovered	Very well in 1872	405
Clamp . .	21 ,,	5 ,,	Recovered	Well in 1872	406
Clamp . .	35 ,,	5 ,,	Recovered	Child born April 1872	407
Clamp . .	16 ,,	5 ,,	Recovered	Well in 1872	408
Clamp . .	. . .	4 ,,	Recovered	Health perfect in 1872. Still single	409

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
410	Hospital	1871 March	32	Married	Omental
411	Mr. Weekes, Hurstpierpoint	,, March	25	Single	Omental
412	Hospital	,, March	30	Single	Parietal
413	Hospital	,, March	36	Single	Parietal
414	Hospital	,, April	43	Single	Parietal
415	Mr. Butler, Guildford	,, April	53	Single	Omental
416	Mr. Scrase, Lewes	,, April	45	Married	Parietal. Burst cyst
417	Hospital	,, April	38	Married	Parietal and omental
418	Hospital	,, April	52	Single	None
419	Dr. Ross	,, May	38	Married	Omental and intestinal. Pregnancy
420	Hospital	,, May	54	Married	Parietal and omental
421	Dr. Mayer, Berlin	,, May	29	Married	Parietal. Both ovaries
422	Hospital	,, May	51	Single	Parietal and omental.
423	Hospital	,, May	54	Single	Parietal
424	Dr. Greenhalgh	,, May	38	Married	None
425	Mr. Fouracre, Hornsey	,, June	19	Single	None
426	Hospital	,, June	29	Married	Omental
427	Dr. Schetelig, Hamburgh	,, June	50	Married	Parietal and mesenteric. Both ovaries
428	Dr. Jackson, Southsea	,, July	50	Single	None
429	Hospital	,, July	29	Married	Parietal and omental
430	Hospital	,, July	35	Married	None
431	Dr. Ronayne, Youghal	,, July	30	Single	None
432	Hospital	,, July	68	Married	Parietal
433	Hospital	,, July	50	Married	None. Both ovaries
434	Professor Winkel, Rostock	,, Aug.	37	Married	None
435	Dr. Bell	,, Aug.	42	Married	Parietal
436	Mr. Barlow	,, Aug.	41	Married	Omental and mesenteric
437	Dr. Boddaert, Ghent	,, Aug.	52	Married	Parietal and pelvic
438	Mr. Ticehurst, Hastings	,, Aug.	22	Single	None
439	Hospital	,, Aug.	32	Single	Parietal and omental. Burst cyst
440	Hospital	,, Aug.	23	Single	None
441	Hospital	,, Oct.	41	Married	None. Both ovaries
442	Mr. Baker, Birmingham	,, Oct.	32	Single	None. Burst cyst
443	Hospital	,, Oct.	42	Single	None
444	Dr. Farre	,, Oct.	50	Married	None
445	Dr. Budd, Clifton	,, Nov.	30	Single	None
446	Dr. Pirrie, Belfast	,, Nov.	40	Married	None
447	Mr. Marriott, Leicester	,, Nov.	42	Married	None
448	Hospital	,, Nov.	27	Single	None
449	Dr. Lyon, Clifton	,, Nov.	29	Single	None
450	Mr. Roughton, Kettering	,, Nov.	42	Married	None
451	Mr. Riggall	,, Nov.	56	Married	Parietal. Cyst suppurating

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Clamp . .	35 pounds	5 inches	Recovered	Very well. Small hernia near cicatrix. Girl born Jan. 1872—labour natural	410
Clamp . .	13 ,,	5 ,,	Recovered	Well in 1872	411
Clamp . .	23 ,,	5 ,,	Recovered	Died April 1872 of acute rheumatism and endocarditis	412
Clamp . .	6 ,,	4 ,,	Died, 5th day	Septicæmia	413
Cautery . .	39 ,,	5 ,,	Recovered	Died in 1872 of bronchitis	414
Clamp . .	7 ,,	4 ,,	Died, 3rd day	Exhaustion	415
Ligature. .	34 ,,	6 ,,	Recovered	Very well in 1872	416
Clamp . .	24 ,,	5 ,,	Recovered	Health good in 1872.	417
Ligature. .	7 ,,	4 ,,	Recovered	No return	418
Ligature. .	32 ,,	5 ,,	Recovered	Child born Dec. 1871, 7 months after operation. Well in 1872	419
Clamp . .	22 ,,	5 ,,	Died, 13th day	Pleuritic effusion	420
Clamp and ligature . .	19 ,,	5 ,,	Recovered	Well in 1872	421
Clamp . .	19 ,,	4 ,,	Recovered	Well and single in 1872	422
Clamp , .	42 ,,	6 ,,	Died, 5th day	Septic peritonitis	423
Clamp . .	33 ,,	6 ,,	Died, 32 hours	Exhaustion	424
Clamp . .	19 ,,	6 ,,	Recovered	Health very good in 1872. Still single	425
Clamp . .	18 ,,	7 ,,	Died	Went home, but died 25 days after	426
Ligature. .	. . .	9 ,,	Died	Peritonitis	427
Ligature. .	. . .	5 ,,	Recovered	Well in 1872	428
Clamp . .	30 ,,	6 ,,	Recovered	Well in 1872	429
Clamp . .	17 ,,	5 ,,	Recovered	Quite well in 1872	430
Clamp . .	22 ,,	4 ,,	Recovered	Well in 1872	431
Clamp . .	25 ,,	6 ,,	Recovered	Well in 1872	432
Clamp and ligature . .	21 ,,	5 ,,	Recovered	Died Dec. 1871 of malignant disease	433
Clamp , .	12 ,,	5 ,,	Recovered	Well in 1872	434
Clamp . .	. . .	5 ,,	Recovered	Very well in 1872	435
Ligature. .	15 ,,	5 ,,	Recovered	Well in 1872	436
Clamp . .	33 ,,	6 ,,	Recovered	Well in 1872	437
Clamp . .	8 ,,	4 ,,	Recovered	Well in 1872	438
Ligature. .	. . .	6 ,,	Died, 5 hours	Collapse	439
Clamp . .	13 ,,	4 ,,	Recovered	Health very good in 1872. Still single	440
Ligature. .	37 ,,	6 ,,	Died, 3rd day	Pulmonary embolism	441
Clamp . .	11 ,,	5 ,,	Recovered	Well in 1872	442
Clamp . .	23 ,,	4 ,,	Recovered	Well in 1872	443
Clamp . .	28 ,,	4 ,,	Died, 7th day	Septicæmia	444
Clamp . .	8 ,,	5 ,,	Recovered	Well in 1872	445
Ligature. .	24 ,,	5 ,,	Recovered	Well in 1872	446
Clamp . .	23 ,,	4 ,,	Recovered	Well in 1872	447
Clamp . .	8 ,,	4 ,,	Died, 5th day	Septicæmia	448
Ligature. .	18 ,,	4 ,,	Died, 5th day	Hyperpyrexia and pericarditis	449
Clamp . .	15 ,,	5 ,,	Died, 23 hours	Exhaustion	450
Clamp . .	49 ,,	8 ,,	Died, 26 hours	Septicæmia	451

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
452	Hospital	1871 Dec.	27	Married	None
453	Hospital	,, Dec.	34	Single	None
454	Hospital	,, Dec.	40	Married	Parietal
455	Hospital	,, Dec.	21	Single	None
456	Hospital	,, Dec.	28	Single	None
457	Sir J. Alderson	,, Dec.	60	Married	Intestinal and mesenteric
458	Dr. Turner, Minchinhampton	1872 Jan.	27	Married	Parietal
459	Hospital	,, Jan.	17	Single	Parietal and omental
460	Mr. Bell, Rochester	,, Jan.	60	Single	Parietal and intestinal
461	Mr. Pollard, Torquay	,, Jan.	55	Married	Parietal and pelvic
462	Dr. Smith	,, Jan.	53	Married	Parietal, omental, and intestinal
463	Mr. Turner, Bermondsey	,, Jan.	46	Married	None. Burst cyst
464	Dr. Stewart, Whitby	,, Jan.	48	Married	Omental and pelvic
465	Hospital	,, Feb.	22	Married	None
466	Mr. Pollard, Torquay	,, Feb.	46	Married	Parietal, omental, and intestinal
467	Dr. Powne, Swindon	,, Feb.	57	Married	Parietal
468	Hospital	,, Feb.	23	Married	None. Burst cyst
469	Hospital	,, Feb.	41	Single	None
470	Hospital	,, Feb.	44	Single	None
471	Hospital	,, Feb.	48	Married	Parietal and omental
472	Hospital	,, Feb.	44	Married	None
473	Hospital	,, March	51	Single	Parietal and omental
474	Hospital	,, March	40	Married	Omental. Burst cyst
475	Hospital	,, March	32	Single	Omental
476	Hospital	,, March	29	Married	Omental. Pregnancy
477	Hospital	,, March	50	Married	None. Burst cyst
478	Hospital	,, April	26	Single	Omental
479	Hospital	,, April	31	Married	Parietal and omental
480	Hospital	,, April	23	Single	Parietal
481	Professor Bardeleben	,, April	24	Single	None
482	Mr. Lys, Blandford	,, April	27	Married	Parietal
483	Hospital	,, April	48	Married	Parietal
484	Hospital	,, April	60	Married	Parietal and omental
485	Dr. Day	,, April	43	Married	None
486	Mr. Earle, Brentwood	,, April	48	Married	None
487	Hospital	,, April	57	Married	Parietal
488	Sir W. Gull, Bart.	,, May	53	Single	None
489	Sir W. Gull, Bart.	,, May	29	Single	Omental
490	Mr. Moreton, Tarvin	,, May	51	Married	Parietal
491	Hospital	,, May	42	Single	None
492	Hospital	,, May	53	Married	Parietal
493	Mr. Mason	,, June	39	Married	Parietal
494	Hospital	,, June	36	Married	Both ovaries. Burst cyst

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Clamp . .	35 pounds	6 inches	Recovered	Remains well	452
Clamp . .	11 „	5 „	Died, 4th day	Septicæmia	453
Clamp . .	51 „	6 „	Recovered	Remains well	454
Clamp . .	16 „	5 „	Recovered	Remains well	455
Pin and ligature . .	10 „	5 „	Recovered	Remains well	456
Clamp . .	15 „	6 „	Recovered	Remains well	457
Clamp . .	22 „	6 „	Recovered	Remains well	458
Clamp . .	16 „	5 „	Recovered	Remains well	459
Clamp . .	33 „	6 „	Recovered	Died in March	460
Clamp . .	10 „	4 „	Recovered	Remains well	461
Clamp . .	18 „	5 „	Recovered	Remains well	462
Clamp . .	. . .	4 „	Recovered	Remains well	463
Clamp . .	41 „	6 „	Died, 3rd day	Exhaustion	464
Clamp . .	24 „	4 „	Recovered	Remains well	465
Clamp . .	15 „	4 „	Recovered	Remains well	466
Clamp . .	14 „	5 „	Recovered	Remains well	467
Clamp . .	36 „	5 „	Recovered	Remains well	468
Clamp . .	15 „	4 „	Recovered	Remains well	469
Clamp . .	16 „	4 „	Recovered	Remains well	470
Clamp . .	33 „	5 „	Recovered	Remains well	471
Clamp . .	28 „	5 „	Recovered	Remains well	472
Clamp . .	19 „	5 „	Died, 4th day	Peritonitis	473
Ligature . .	16 „	5 „	Died, 3rd day	Peritonitis	474
Ligature . .	30 „	5 „	Died, 7th day	Peritonitis	475
Ligature . .	10 „	5 „	Recovered	Child (girl) born at 6th month; lived 21 hours; mother quite well	476
Clamp and ligature . .	17 „	7 „	Died, 4th day	Pneumonia	477
Clamp . .	20 „	6 „	Recovered	Remains well	478
Clamp . .	24 „	4 „	Recovered	Died, July 1872—obstructed intestine	479
Clamp and ligature . .	25 „	7 „	Recovered	Remains well	480
Clamp and ligature . .	12 „	6 „	Recovered	Remains well	481
Clamp . .	27 „	5 „	Recovered	Remains well	482
Clamp . .	. . .	5 „	Recovered	Remains well	483
Clamp . .	26 „	7 „	Recovered	Remains well	484
Clamp . .	8 „	5 „	Recovered	Remains well	485
Clamp . .	14 „	4 „	Recovered	Remains well	486
Clamp . .	. . .	5 „	Recovered	Remains well	487
Clamp . .	22 „	4 „	Recovered	Remains well	488
Clamp . .	26 „	5 „	Recovered	Remains well	489
Clamp . .	28 „	4 „	Recovered	Remains well	490
Clamp . .	. . .	6 „	Recovered	Remains well	491
Clamp . .	. . .	5 „	Recovered	Remains well	492
Clamp . .	34 „	5 „	Recovered	Remains well	493
Clamp . .	21 „	4 „	Recovered	Remains well	494

No.	Medical Attendant	Date of Operation	Age	Condition	Adhesions
495	Dr. Hickson, Scarboro' . .	1872 June	22	Single	None . . . . .
496	Hospital	,, June	45	Married	Parietal and omental . .
497	Mr. Bracey, Birmingham . .	,, June	48	Married	Parietal and omental . .
498	Mr. Whipple, Plymouth . .	,, June	21	Single	None . . . . .
499	Hospital	,, June	37	Married	Parietal and omental . .
500	Hospital	,, June	54	Married	Parietal and omental . .

In the concluding chapter some remarks may be found upon the results of these five hundred cases, and upon the subsequent history of the patients who recovered. The cause of death in the fatal cases may be seen by a glance along the last column to be chiefly peritonitis, or some form of pyæmic fever or blood-poisoning so often associated with peritonitis. Collapse or exhaustion have been the terms used to express the condition when a very feeble patient has not rallied after the removal of a large tumour. I have never lost a patient from hæmorrhage. In two cases tetanus proved fatal. In some obstructed intestine, and in others superfibrination of blood and deposits of fibrous coagula in the heart were the immediate causes of death.

The results of ovariotomy in different seasons are stated at page 322. The varying results of hospital and private practice may be found at page 322. The results at different ages are given at page 321, with the influence of the married and single condition. The question of adhesions is considered at page 319, the situation and length of incision in Chapter XIII. In

ERRATUM

In the above Table the first line should be—

Clamp	349 cases	280 recoveries	69 deaths
The total .	500 ,,	373 ,,	127 ,,

There are 128 cases of death in the table, but in case 111 the patient recovered from the operation, though she died six weeks after it of cancer.

Treatment of Pedicle	Weight of Tumour	Length of Incision	Result	Subsequent History or Cause of Death	No.
Pin and ligature . .	18 pounds	5 inches	Recovered	Remains well	495
Ligature . .	25 ,,	6 ,,	Recovered	Remains well	496
Clamp . .	26 ,,	5 ,,	Recovered	Remains well	497
Clamp . .	6 ,,	4 ,,	Recovered	Remains well	498
Clamp . .	16 ,,	5 ,,	Recovered	Remains well	499
Ligature . .	24 ,,	5 ,,	Recovered	Returned to Suffolk. Died a month after with cerebral symptoms	500

Chapter XV. the various modes of dealing with the pedicle are fully described, and the numerical results of each of the different methods followed in the 500 cases may be seen in the subjoined table:—

Clamp	349 cases	279 recoveries	70 deaths
Pin and Ligature acting as Clamp	15 ,,	10 ,,	5 ,,
Clamp and Ligature . . .	34 ,,	23 ,,	11 ,,
Ligature returned . . .	57 ,,	29 ,,	28 ,,
Ligature brought out . .	14 ,,	6 ,,	8 ,,
Cautery	16 ,,	14 ,,	2 ,,
Cautery and Ligature . .	14 ,,	10 ,,	4 ,,
Écraseur	1 ,,	1 ,,	0 ,,
	500	372	128

The very successful result of the cases where the cautery alone sufficed to secure the pedicle, and the less successful but still satisfactory result where ligature was necessary to supplement the action of the cautery, may be taken as encouragement to further trials of the cautery, if the health of patients after recovery prove to be as good as after the extra-peritoneal treatment of the pedicle.

CHAPTER XVII.

ON THE REMOVAL OF BOTH OVARIES AT ONE OPERATION.

In the chapter on the performance of ovariotomy twice on the same patient particulars will be found of four cases where the patient recovered after the removal of one ovary, after some months or years became the subject of disease in the other ovary, and underwent a second time the operation of ovariotomy. Two recovered and two died after this second operation. In that chapter some remarks will be found upon the comparative frequency of disease in one or both ovaries bearing upon the subject of the present chapter; namely, the removal of both ovaries at one operation.

It has been already explained how, after removing one ovarian tumour, the surgeon should search for and examine the other. In the large majority of cases the other ovary is healthy, and should not be disturbed; but occasionally it is more or less enlarged; and it becomes a question whether it should be removed, whether any cysts projecting from its surface should be punctured and their contents squeezed out, or whether it is more prudent to be content with the removal of one ovary, hoping that the other will never increase sufficiently to need surgical interference, or at any rate postponing that interference till after recovery from the first operation. In determining which of these lines of practice to follow, the age of the patient, her conjugal condition, and the ease or difficulty with which the second operation could be performed, are the leading points for consideration.

There can be no doubt that the removal of the second ovary does add to the danger of the single operation. Of five hundred cases of completed ovariotomy, including both single and double operations, there were 127 deaths, or 25·4 per cent. If we deduct from the five hundred twenty-five cases where both ovaries were removed, this would reduce the number of single operations to

475, and the deaths to 115, with a mortality of 24·44 per cent. But as of the twenty-five cases of double ovariotomy eleven died, the mortality is 44 per cent., or nearly double that of the single cases. This is quite sufficient to show that the surgeon should hesitate and certainly not remove the second ovary without good reason. I have several times been begged by patients before the operation to remove the second ovary, even if it were healthy and the risk of the operation increased, in order that they might be spared from the possibility of being again subject to similar disease; and medical men have occasionally supported this not unnatural wish of the patient. I have always replied that I should object to the removal of a healthy organ if that removal endangered the success of an operation which was clearly necessary, that as a rule the removal of one ovary would not be followed by disease of the other, that the double operation would necessarily render the woman sterile, and that there might probably be some consequences of the removal of both ovaries, such as an undue deposit of fat, or obscure nervous symptoms, or some change in feminine physiological peculiarities, which would be objectionable if not directly prejudicial. For these reasons I am of opinion that a healthy ovary should not be removed from any woman at any age. The amount of apparent disease in an ovary which would justify the removal of the organ may vary with the age and condition of the patient. In a woman past the age of child-bearing a small amount of apparent disease would justify removal of the ovary, whereas a surgeon should hesitate before he condemns a young woman to permanent sterility.

Sometimes during an operation, after removal of one ovary, some slight alteration in the other may be observed, and the question of removal of the second ovary may arise. In more than one of my cases this question has arisen. In narrating the 112th case of ovariotomy in my first work on 'Diseases of the Ovaries,' after recording the removal of the right ovary from a young lady aged nineteen, I continue, p. 307 :—

'The left ovary was enlarged to nearly double the normal size. Two follicles, about the size of cherries, were distended by clot. These I laid open, turning out their contents. . . . The operation was peculiar on account of the doubt as to the

treatment of the left ovary. I resolved after consulting with Dr. Greenhalgh (who was assisting me) not to remove it, because—

'*a*. The ligature which would have been necessary would have added seriously to the risk of the operation.

'*b*. It is not certain that *disease* was present in the ovary, or that it would progress, and if it did a second ovariotomy could still be done.

'*c*. It seemed hard to unsex a girl of nineteen. Perhaps the clots might have been left alone, but turning them out could do no harm, and might do good.'

This operation was performed in November 1864. The patient recovered well, went into the country four weeks after operation, was married in August 1865, and is now the mother of three girls and a boy, born in September 1866, March 1868, September 1869, and July 1871. Mr. Morgan, who attended her, informed me that all the pregnancies and labours were perfectly natural.

Of the twenty-five cases in which both ovaries were removed at one operation, eight were fifty years of age or more, four were between forty and fifty, and thirteen were under forty. Seventeen were married, seven single, and one was a widow.

The table on pp. 434, 435 includes all the cases of double ovariotomy in the order of their occurrence, taken from the general table of cases of completed ovariotomy and arranged nearly in the same form.

The chief point of practical importance in double ovariotomy is the mode of dealing with the pedicle. I have once secured both pedicles by one clamp, and have once used two clamps, one on each pedicle, and kept both clamps outside with no more inconvenience to the patient than if one clamp only had been used, and with a completely successful result. In another case I tried to do this, but the pedicles were too large. I accordingly transfixed them by a large pin and tied both pedicles together behind the pin. The pin thus became a sort of clamp and secured the extra-peritoneal separation of the pedicle. I have secured one pedicle by a clamp and the other by ligature, fixing the latter to the clamp, in this way conveniently effecting the extra-peritoneal mode of treatment; and this is the plan I should be disposed to recommend whenever it is practicable

More than once, after securing one pedicle by a clamp, owing to the absence of a pedicle to the other tumour, I have transfixed and tied the attachment, cut the ends of the ligatures off short, and left them in the abdomen. I have also treated both ovaries in this manner, and I have, after tying one or both pedicles, brought the ligatures out through the wound. The results are strongly in favour of the extra-peritoneal method of dealing with both pedicles whenever it is possible. Thus of nine cases where both pedicles were fixed outside by one or two clamps, or by applying a clamp on one pedicle and fixing the ligature on the other to the clamp, or using a pin to transfix the pedicles and tying them behind the pin, which thus became a sort of clamp, in either way securing both pedicles outside the abdominal wall, seven recovered and only two died. Of six cases where the pedicle on one side was kept out by the clamp, and the other pedicle tied, the ligature being left in, four recovered and two died. Of six cases where both pedicles were tied and the ligatures left in, four died and two recovered. Of four cases where the ligatures were brought outside, acting as a drain and keeping the lower angle of the wound open, only one recovered and three died. Of those who recovered, one died two years afterwards of hemiplegia, another two years afterwards of cardiac dropsy, and a third six months after operation of peritoneal cancer. Ten were in good health in 1872.

Cases where both Ovaries were Removed at One Operation.

The Roman Numerals give the order of these Cases; the ordinary figures, the number of the case in the General Table.

Number.		Medical Attendant.	Date of Operation.	Age.	Condition.	Treatment of Pedicles.	Result and Subsequent History.
I.	8	Hospital	1859. July	47	Married	Both kept out by clamp.	Recovered. Died 2 years after of hemiplegia. Both pedicles, fixed to cicatrix, of sufficient length to leave uterus in its normal position.
II.	83	Mr. Archer	1863. Dec.	34	Married	Ligatures brought out.	Died, 3rd day, peritonitis.
III.	100	Hospital	1864. June	54	Married	Both pedicles kept out; one by clamp, the other by ligature tied to clamp.	Recovered. In good health in 1872.
IV.	110	Dr. De Mussy	1864. Nov.	49	Married	Ligatures; one brought out.	Recovered. In good health in 1872.
V.	131	Dr. Whitehead, Manchester.	1865. June	56	Married	Ligatures brought out.	Died, 30 hours, exhaustion.
VI.	134	Dr. Beatty, Dublin	1865. June	37	Married	Ligatures left within.	Recovered. In good health in 1872.
VII.	148	Dr. Perrochaud, Boulogne.	1865. Dec.	50	Married	Vessels only tied and ligatures left within.	Died, 22nd day, chronic peritonitis.
VIII.	264	Dr. Ellis	1868. April	54	Single	Pins and ligatures acting as a clamp.	Died, 80 hours, exhaustion.
IX.	265	Hospital	1868. May	39	Widow	Clamp on one side and ligature on the other, secured to clamp.	Recovered. In good health in 1872.
X.	287	Hospital	1868. Oct.	53	Married	Ligatures left within.	Died, 20 hours, collapse.
XI.	289	Dr. West	1868. Nov.	31	Married	Clamp on one pedicle, ligature on the other returned.	Died, 29 hours, peritonitis.

XII.	308	Hospital	1869. Feb.	49	Married	Clamp on one side, and ligature on the other, cut off short and returned.	Recovered.
XIII.	319	Hospital	1869. May	22	Single	Clamp on one side, and ligature on the other, secured to clamp.	Recovered; became stout and florid. In good health in 1872.
XIV.	320	Dr. B. Hicks	1869. May	39	Married	Clamp on one pedicle, ligature on the other left in.	Recovered. Died in April 1871, of cardiac dropsy.
XV.	322	Hospital	1869. June	24	Married	Ligatures brought outside	Died, 28 hours, exhaustion.
XVI.	348	Dr. Monro	1870. Jan.	34	Single	Clamp on one side, ligature on the other left in.	Recovered. In good health in 1872.
XVII.	353	Dr. Priestley	1870. Feb.	20	Single	Clamp on one side, ligature on the other tied to clamp.	Died, 5th day, peritonitis.
XVIII.	378	Hospital	1870. July	38	Single	Clamp on one side, ligature on the other left in.	Died, 4th day.
XIX.	388	Dr. Smith, Weymouth	1870. Oct.	52	Single	Clamp on one pedicle, ligature on the other fixed to clamp.	Recovered. Well in 1872.
XX.	421	Dr. Mayer, Berlin	1871. May	29	Married	Clamp on one pedicle, ligature on other returned.	Recovered; well in 1872; menstruating regularly.
XXI.	427	Dr. Schetelig, Hamburg.	1871. July	50	Married	Ligatures left within	Died, 32 hours, peritonitis
XXII.	433	Hospital	1871. July	50	Married	Ligatures left within	Recovered from operation. Died six months after of cancer.
XXIII.	441	Dr. Carey, Taunton	1871. Oct.	41	Married	Ligatures left within	Died, 3rd day, septicæmia and clot in heart.
XXIV.	494	Hospital	1872. June	36	Married	Two clamps	Recovered.
XXV.	495	Dr. Priestley	1872. June	22	Single	Pin and ligatures acting as clamp	Recovered.

CHAPTER XVIII.

ON OVARIOTOMY PERFORMED TWICE ON THE SAME PATIENT.

The first patient upon whom I performed ovariotomy, one ovary having been previously removed, had been operated on by Mr. Baker Brown six months before she consulted me on account of a recurrence of the disease. The paper in which I described this case was read before the Medical and Chirurgical Society in June 1863, and appears in the 'Transactions' for that year. The following paragraphs are quotations from that paper:—

'In November 1862, I was consulted by a married woman, forty-two years of age, from whom an ovarian tumour had been removed six months before by another surgeon. She left the institution in which ovariotomy was performed three weeks after the operation; but about a week after going home she became sick, and noticed an enlargement on the right side of the abdomen. She consulted Sir Charles Locock, who had seen her before the first operation, and who told her that another tumour was growing. Sir Charles saw her again in October, told her that the tumour was increasing, and advised her to wait about three months before having a second operation performed.

'When she came to me I was not aware that ovariotomy had ever been performed twice on the same patient. A case had been recorded in America where one surgeon had attempted to remove an ovarian tumour, but failed in his attempt, and another surgeon had afterwards succeeded. But I could find no case on record in which a patient had recovered after ovariotomy, and had afterwards undergone the operation a second time on account of disease of the remaining ovary. I was, therefore, very anxious to obtain the opinion of eminent men respecting this patient, and I believe that several who saw her with me looked upon the case as unprecedented. But I have

since learned that Dr. Atlee, of Philadelphia, has performed ovariotomy successfully upon a patient from whom Dr. Clay, of Manchester, had removed an ovarian tumour of the opposite side sixteen years before. The case which I bring before the Society is, therefore, not the first in which ovariotomy has been performed twice on the same patient; but it still appears to be sufficiently interesting to justify me in bringing it thus prominently before the profession.

'When the patient first consulted me the tumour filled the greater part of the abdomen below the level of the umbilicus. On the right side it was elastic and obscurely fluctuating, while on the left side it was very hard. The uterus seemed to be closely connected with the hard tumour on the left side. The catamenia had not appeared since the first operation; but at every monthly period she had had pains in the back and thighs, lasting for a day, and leaving pain in the right hip and swelling of the breasts for two or three days. Ever since the operation she had complained of pains below the epigastrium, with flatulence, and the bowels never acted without purgative medicine.

'On the 25th of December, the usual symptoms returned with the monthly period; but this time the discharge came on, not excessive in amount, without clots, and lasted five days.

'On January 3, 1863, the girth of the abdomen at the umbilical level was thirty-five inches, and forty inches over the most prominent portion of the abdomen, which was about three inches below the umbilicus. The distance from symphysis pubis to umbilicus was eleven inches, and from umbilicus to ensiform cartilage six inches. From one anterior superior spinous process of the ilium across the abdomen to the opposite process the distance was eighteen inches. There was a hard cicatrix three-quarters of an inch to the right of the linea alba, extending from two inches below the umbilicus to seven inches from this point; the cicatrix thus being five inches long. The tumour moved freely beneath the abdominal wall, but there was a slight crepitus felt nearly all over it as it moved. There was still the same extreme hardness of that portion of the tumour to the left of the umbilicus, and the same elasticity and obscure fluctuation of the portion to the right, as at my first examination.

'It was evident that the connection between the uterus and the tumour was close, for as the patient lay on her side the uterus was pulled almost out of reach. The uterine sound passed to four and a half inches; not towards the hard tumour on the left side, but towards the right side, its point being distinctly perceptible just above the right internal abdominal ring. Fluctuation could be detected (though not very distinctly) in the vagina, below the hard portion of the tumour on the left side.

'I communicated with Sir Charles Locock upon all these points, and proposed to make an exploratory incision, and to be guided by the connection of the tumour as to further proceedings. Sir Charles approved of this suggestion, and added, "the operation affords the only hope of relief."

'Before proceeding to operate, I considered whether it would be better to make the incision through the linea alba—that is, within an inch of the cicatrix—or in one of the lineæ semilunares. But as there was some doubt whether the tumour was a growth from the right ovary, or a growth of some portion which had not been removed from the left side—in other words, whether the uterus was *pulled* or *pushed* to the right side—it appeared to be safer to cut in the median line than to run any risk of making the incision on the side opposite to the uterine attachment.

'I performed the operation on January 13, 1863. Mr. Clover administered chloroform, and I was ably assisted by Dr. Savage, Dr. Drage, of Hatfield, and Mr. Webb, of Welwyn. I made an incision over the linea alba, three-quarters of an inch to the left of the cicatrix, and parallel with the lower four inches of it. On dividing the peritoneum, the tumour was seen to be composed of very thin-walled cysts, very tensely distended with clear fluid. These cysts, or rather divisions of a multilocular cyst, passed successively through the opening in the abdominal wall as Dr. Savage pressed the tumour from behind forwards. Several filmy layers of organised lymph and a layer of expanded omentum were pressed outwards before the cyst, and were divided on a director. A piece of omentum which adhered both to the cyst and to the abdominal wall near the upper part of the incision was easily separated, and the tumour was then pressed out entire, without emptying any of

the cysts. The pedicle was short, but it was easily secured by a clamp. It passed in the usual manner from the right side of the uterus. The uterus seemed to be of natural size. No remnant of the left ovary was found. After cutting away the tumour, there was some oozing of blood around the clamp, but it was stopped by tying a ligature tightly round the pedicle beneath the clamp. One bleeding vessel in the abdominal wall, and two in the omentum, were also tied. Just above the upper angle of the wound a long coil of small intestine adhered firmly to the abdominal wall. As the patient had complained of pain at this spot, and had suffered from constipation ever since the first operation, I examined the connection between the intestine and the abdominal wall to see if they could be separated safely; but the adhesions appeared to be so very close that I did not attempt to effect any separation. The wound was closed by deep and superficial silk sutures.

'The cyst is placed on the table of the Society. It is a good specimen of what is known as the compound proliferous cyst; and it is curious that the small groups of minute cysts not only grow into the cavity of the parent cyst, or project inwards, but also perforate the cyst-wall and project into the peritoneal cavity.

'The patient rallied remarkably well after the operation, and for forty-eight hours seemed to be recovering. Two small opiates were given on account of pain, but reaction was not excessive. The aspect was good; and the tongue, though white, was moist. The pulse was about 100. I removed the clamp forty-four hours after operation, as it seemed to be lying quite loose on the wound; the ligature which had been tied beneath it also came away with a shred of dead fibrous tissue. There was no bleeding. I also removed three of the sutures.

'On the 16th, the third day after operation, there was some flatulent distension of the abdomen, and frequent eructation, but no vomiting. The rectum was cleared by an enema. At 9 P.M., during one of the "fits of belching," as the nurse called them, the lower part of the wound gave way, and a knuckle of intestine protruded. A good deal of fetid serum also escaped. I returned the intestine, re-applied three sutures deeply, and the patient did not seem to be worse.

'On the next day, the 17th, there was free fetid discharge from the lower part of the wound, and vomiting became troublesome; but the pulse was not more than 110, and the aspect was good.

'On the 18th, the pulse had risen to 120, but the tongue was moist and cleaning from the edges, and the colour of cheeks and lips very good. Still she was decidedly weaker, and the tympanites was increasing.

'She continued to become weaker all the next day, notwithstanding the free use of stimulants and nourishment both by the mouth and the rectum; and she died on the seventh day, or 154 hours after the operation.

'Decomposition of the body took place very rapidly. There was a good deal of fetid serum in the peritoneal cavity, and some traces of recent peritonitis were also shown by flakes of lymph. There was no blood or clot to be seen, and only one or two shreds of sloughy tissue at the spot where the tumour had been removed from the right side of the uterus. The peduncle of the tumour first removed connected the left side of the uterus closely with the abdominal wall. The adhering portion of intestine observed during my operation was so closely attached to the abdominal wall that it was difficult to separate it by dissection; and the greater part of the omentum also adhered to the abdominal wall.

'This case alone is sufficient to prove that ovariotomy may be performed twice on the same patient without any unusual difficulty. What the risk may be as compared with the risk of first operations can only be ascertained by a number of cases.

'Reflection upon this case would seem to suggest that, in performing the operation for the second time on the same patient, it may prove advisable to make the incision at some distance from the cicatrix left after the first operation; or, if the incision be made near the cicatrix, it may be necessary to leave the sutures longer than in ordinary cases, as the process of union may be slower near a cicatrix than in an uninjured part.

'The lessons suggested to those who perform ovariotomy under ordinary circumstances are—

'1. That the operator should be careful not only to remove every portion of an ovarian tumour on one side, if it be possible to

do so, but also to examine the opposite ovary carefully, and to be guided in his practice by the knowledge that if the ovary be not healthy and be left behind, morbid growth will probably take place, and a second operation be required.

'2. That in uniting the wound in the abdominal wall the divided edges of peritoneum should be brought closely together in the manner which I was the first to propose in a paper presented to this Society five years ago. The adhesions between the omentum and intestine and the abdominal wall observed in this patient precisely resemble the condition which I have observed in dogs, rabbits, and guinea pigs after opening the abdomen, and closing the wound by sutures which have not included the peritoneum. In every case, the serous bag was completed by adhesion of portions of omentum or intestine, or of both; and in some cases the animals were greatly inconvenienced by these attachments. But in all the cases where two surfaces of peritoneum had been pressed together by the sutures, union took place without any adhesion of intestine or omentum. Several preparations are placed on the table of the Society which illustrate this fact, and show that the supposed danger of the sutures coming into contact with and irritating the viscera, or of the tracks of the sutures forming fistulous openings between the skin and the peritoneal cavity, are purely imaginary dangers. It is demonstrable that the folding together of the peritoneal borders of the wound completely conceals or shuts off the sutures from the cavity of the peritoneum; and even if the sutures are left long enough to form sinuses, these must still be external to the peritoneal cavity.

'The surgeon who performed the first operation on this patient does not include the peritoneum in his sutures; and I think that the adhesion of intestine and omentum with the consequent discomfort and constipation suffered by the patient —evils observed in animals so treated, but never observed in those where the peritoneum had been included in the sutures, nor in any of the patients who have either died or recovered under my care—are strong arguments in favour of that mode of uniting all penetrating wounds of the abdominal wall which I have submitted to the consideration of the Profession in this and former papers brought before the Society.'

In November 1866 I brought before the Medical and

Chirurgical Society a case in which I performed ovariotomy twice on the same patient myself, and she recovered after both operations. In introducing that case I referred to the case which has just been quoted, and to the case in which Dr. Atlee successfully performed ovariotomy upon a patient whose opposite ovary had been removed sixteen years before by Dr. Clay.

I also referred to a case which has never been published, in which Dr. Frederick Bird operated unsuccessfully for the second time upon a patient from whom he had removed one ovary fourteen years before. I believe the case, which I am now about to quote from the fiftieth volume of the 'Medico-Chirurgical Transactions,' is the first in which ovariotomy was twice successfully performed upon the same patient by the same surgeon.

'I performed the first operation in the Samaritan Hospital on February 15, 1865. The patient was an unmarried schoolmistress, aged twenty-four, who was admitted on December 29, 1864. She was feeble, and had a strumous appearance, with a hectic flush on each cheek. Her extremities were habitually cold, but there was neither œdema nor varicose veins of the lower extremities. Occasionally she had a troublesome cough, and expectoration was free, especially at night; but there were no night sweats. On percussion, the left side of the thorax was duller than the right, and expiration was a little prolonged in the left lung. Dr. Parson, who examined the chest carefully, thought that there was "no tubercle, unless in small quantities and scattered." The heart's sounds were normal, but the heart was displaced upwards, the apex being felt between the third and fourth ribs. The liver, stomach, and transverse colon were also displaced upwards. The urine was of low specific gravity, about 1015, but contained no albumen. The whole abdomen was occupied by an irregular tumour, in some parts of which fluctuation was perceptible.

'The patient's parents were healthy; but three of her sisters had died of phthisis. She herself had always enjoyed good health, and had menstruated regularly up to Christmas 1863. About that time her body began to enlarge without any known cause; pain in the *left* side became tolerably constant, and occasionally acute. By March 1864 the swelling was chiefly felt on the *right* side of the abdomen; it steadily increased in

size and became fluctuant. In October 1864 and again in November of the same year, Dr. Robbs, of Grantham, tapped, and on each occasion drew off about twelve pints of clear viscid fluid. After her admission to the hospital in December, a little swelling of the left leg was observed. On January 4, 1865, I tapped and removed seventeen pints of fluid. After the tapping, crural phlebitis in the left side increased, and the leg and thigh were much swollen and very painful. The heart and liver descended a little, and the general health improved; but the cyst refilled rapidly, and on January 30 I tapped again and removed eighteen pints of whitish glutinous fluid, similar to that before evacuated. After this tapping, groups of cysts, irregularly disposed, and evidently adhering in some places to the abdominal wall, were felt filling the whole of the hypogastric region, and on the right of the median line, above the umbilicus, extending nearly up to the sternum.

'The uterus was high and to the left side; its mobility was restricted. The os was small and virginal; the tumour was felt to the right side of the uterus, pushing that organ to the left, but the tumour was scarcely below the brim of the pelvis. After the last tapping the heart beat a full inch lower than it had done before; but the apex of the left lung was still duller than the right.

'Although the feeble state of the general health, the displacement of the thoracic viscera, and the family history, did not augur favourably for ovariotomy, it was so clearly the only resource that it was performed on February 15, after consultation with Dr. Routh. An incision was commenced one inch below the umbilicus, and carried downwards for five inches. there were extensive adhesions between the cyst and abdominal wall, above and to the right of the incision, extending to the brim of the pelvis, but they gave way to the hand. Having tapped and emptied a large cyst, and broken down a second within the first, the tumour was drawn out, and a piece of adhering omentum was separated. The pedicle was three to four inches in length, extending from the left side of a long thin uterus; it was secured in a small clamp, and left outside without traction. There was a little oozing from the separated adhesions. The blood was carefully sponged away, but no vessel required ligature. The right ovary was felt to be

healthy. The wound was closed with five deep and three superficial sutures.

'The patient rallied well, complained of but little pain, and only required one opiate. The stitches were all removed on the third day,—the clamp on the eighth day. The bowels acted for the first time on the thirteenth day, but there had been no uneasiness from the prolonged constipation. She left the hospital four weeks after the operation, and returned to the country in good health.

'About twenty-two pints of fluid were evacuated at the operation, and the more solid remainder of the tumour weighed about seven pounds. The following description of this part of the tumour is by the late Dr. C. G. Ritchie:—

'"The great bulk of the tumour is made up of five or six large cavities, whose dissepiments have been cut through or torn through during the operation. The walls of these cysts are from half an inch to two inches thick, but they owe their thickness entirely to the presence of innumerable vesicles, some of which are of the size of a pea, others that of a pippin. The vesicles are for the most part diaphanous, but in almost every one of them is to be observed a white streak, which examination shows to be contained in the jelly-like contents and not in the translucent wall. Some of the cysts, instead of being diaphanous, are quite white; the contained fluid in these has much the appearance of milk. Some of the cysts are set so closely together that they considerably modify the shape the one of the other; others, again, are solitary and spherical. The outer tunic of the tumour is of course peritoneal; it is marked with traces of inflammatory adhesions. The remains of the pedicle consist of a double layer of broad ligament, of the ovarian vessels, and the Fallopian tube."

'The patient remained extremely well for more than a year after the first operation. On February 14 last she wrote to me as follows:—"A year having elapsed since my operation, I am thankful to tell you that I am quite strong again, and have never taken any medicine since I left the hospital. I am a wonder to myself when I consider how dangerously ill I was." I did not hear of her after this until she came to town and called on me, on August 6, when I found a semi-solid tumour

of the right ovary, reaching up to the false ribs on the right side, in the centre to two inches above the umbilicus, and extending towards the left side half way between the umbilicus and anterior superior spine of the ilium. The uterus was freely moveable. She said she had not noticed any increase in size for more than a month, but had felt pain in the right side in the spring. The catamenia had been regular till a month ago, but latterly had become scanty. At the periods in April and May dysmenorrhœal pain was excessive. There was some cough, but no very urgent symptom, and she returned to the country to consider my advice to submit again to ovariotomy before her general health became seriously impaired. About a fortnight later, on August 24, her sister wrote to tell me that the patient's cough had become very troublesome, and she was so much weaker, and generally so much worse, that if she continued to lose her strength she would not be able to go through the operation. As the Samaritan Hospital was closed for repairs, a room in the neighbourhood was procured, and the patient came to town on August 29. The tumour had grown very rapidly, dyspnœa and cough were very troublesome, temperature in axillæ 101° Fahr., and urine scanty. She had begun to perspire a great deal at night. The catamenia were expected in ten days. Careful examination of the chest failed to detect anything not explicable by the displacement upwards of the diaphragm by the ovarian tumour, which just reached the ensiform cartilage. As there was no cyst large enough to tap with any hope of affording even temporary relief, I performed ovariotomy the day after she arrived in town, August 30, 1866, just eighteen months and a half after the first operation. Professor White, of Buffalo, United States, and Dr. Hjort, of Christiania, were present. I was assisted by Dr. Bowen and Dr. Wright, and Dr. Junker administered chloroform. Bearing in mind the slow and imperfect union in my former second operation, when I made the incision very near the cicatrix of the first operation, I made it in this case an inch and a half to the right of the cicatrix (which was exactly in the middle line), and carried it from one inch above the umbilical level downwards for five inches. Its lowest point was about half an inch higher than the level of the lowest point of the cicatrix.

Three arteries, one of considerable size, were divided near the lower end of the incision, beneath the divided muscle, and were tied before the peritoneum was opened. A thin-walled compound cyst was closely adherent all over its anterior surface, but the adhesions yielded easily to my hand. I introduced a large trocar, but the cysts were too small and the contents too viscid for any fluid to escape. I accordingly opened the tumour, broke it up inside, pressed out a great deal of its viscid contents, and then withdrew the remainder, after separating a piece of adhering omentum. A broad thin pedicle extended about two inches from the right side of the uterus. The uterus was in its normal position; but the pedicle of the tumour removed at the first operation passed from the left side of the uterus and adhered firmly to the lower angle of the cicatrix in the middle line of the abdominal wall. The pedicle of the tumour about to be removed was enclosed in a broad clamp, and the tumour was cut away; three omental vessels were tied, and the ligatures cut off short. There was very little bleeding, but as some ovarian fluid had escaped, the peritoneal cavity was carefully sponged out. The pedicle on the left side interfered a little with this process, but it was continued until the sponges came quite clean from the lowest part of the space between the uterus and rectum. Finding that there would be considerable traction on the uterus and broad ligament if the clamp were kept outside, I determined to apply the actual cautery and burn off the portion of cyst left above the clamp, and be prepared to tie any vessel which might bleed on removing the clamp. Protecting the abdominal wall by two shields of talc—a most perfect non-conductor of heat—I used three or four hot irons, and as on separating the blades of the clamp there was no bleeding, the compressed and seared pedicle was allowed to sink into the pelvis. The wound was closed by silk sutures. The fluid or jelly-like substance removed with the fragments of the broken-up tumour, together measured eighteen pints. The following description of the tumour is by Dr. Junker:—

'"The tumour consisted of an oblong mass, divided by delicate fibro-membranous septa into numerous chambers or loculi of various size. These septa, as well as the main wall,

were exceedingly thin and friable; so much so that the tumour broke up into fragments on very slight pressure. Some portions of the main wall and of the septa were very vascular, and covered with what appeared to the naked eye circumscribed round or oval red spots, having diameters varying from one to three lines. Under the microscope, however, these spots proved to be a dense capillary network, with well-defined abruptly terminating outlines. The interior of the loculi was in many places coated by a true tubercular deposit, often corresponding in size and situation to the red spots just described. In other places the tubercular exudation was more profuse, and some of the lesser loculi were entirely filled by yellow tubercular masses. Genuine tubercles, softening, or in a state of cretification (*Verkreidung*, of Rokitansky), were also found imbedded in the stroma. In some places the septa were softened or destroyed by the tubercles. The loculi were filled with a thin reddish or yellow, slightly ropy fluid, which in some of the chambers appeared more turbid from the presence of minute tubercles suspended in the fluid."

'The progress of the patient after the second operation was quite as satisfactory as after the first. There was rather more pain and sickness during the first thirty-six hours after operation, and three opiates were required during the first twelve hours. After the second day all unfavourable symptoms ceased, and she made a most satisfactory recovery. On the second day I left town, and Dr. Junker carried on the after treatment; he removed the stitches on the third day. The wound was well united, but there was an appearance of commencing suppuration around the ligatures left on the superficial vessels. There was no more sickness, and the cough had entirely disappeared. On the sixth day there was some purulent discharge beside the ligatures, but it ceased on the ninth day, when the ligatures came away. The bowels acted on the twelfth day—the pulse, respiration, and temperature by that time having reached the normal standard. Before the operation the pulse was 108, respirations 20, temperature 101·4. The following table from Dr. Junker's notes gives the range on each day after operation until the bowels acted and the normal standard was maintained:—

	Temperature.	Pulse.	Respiration.
Day of operation	101·4	112	32
First day after	100·4	98	22
Second „	99·5	86	20
Third „	100·4	92	24
Fourth „	99	90	26
Fifth „	99·4	88	20
Sixth „	100·2	100	24
Seventh „	99·2	84	20
Eighth „	99·4	78	22
Ninth „	98·8	84	20
Tenth „	98·2	84	22
Eleventh „	99·4	94	24
Twelvth „	98·4	84	22

'Morning and evening observations were taken, but only the highest range each day has been given in the above table. The fall in temperature, pulse, and respiration after the operation is remarkable and very unusual. The slight elevation on the third day before the removal of the stitches is very common. So is the rise on or about the sixth day when there is any superficial suppuration about the wound, as well as the rise just before the bowels are relieved for the first time. After the bowels acted, strength was rapidly gained, and the patient returned by railway to Lincolnshire twenty-nine days after the operation.'

'*Note added November* 13, 1866.—I have heard from her twice since her return home. The last letter is dated November 10, 1866. She says, "I think upon the whole I feel as well as I did after my first operation. My voice is stronger. I can sing the upper notes with greater facility than formerly. I can sing from A up to C natural." I was curious to have the range and power of the voice observed after the removal of both ovaries, and it could be done with unusual accuracy in this case, as the patient is a teacher of singing.'

In 1867, this patient went to reside at Brighton, and fulfilled her duties as a schoolmistress there for more than a year. I heard of her more than once as being in good health, but on June 30, 1868, I received a letter from Mr. Humphry, stating that she had died two days before, and adding, 'About a week before her death I saw her for the first time, when she had slight congestion at the bottom of one lung. In two or three days this subsided, but she seemed to get worse, great prostra-

tion, some sickness, small, quick pulse, restlessness of manner, and some fulness of abdomen leading me to fear some serious mischief about the seat of the old disease. These increased, with swelling of the left leg, which was painless, as was the abdomen; and she quickly sank. I found about a gallon of almost clear serum in the abdomen. No general adhesions. One pedicle adherent to lower end of scar in the abdominal wall, and adhesion between bowel and bladder. Uterus very small and elongated, from dragging to abdominal wall through pedicle. Clot in left iliac vein. No other sign of disease. I could only lay the attack to cold.'

I have in one other case performed ovariotomy successfully twice on the same patient. The first operation was performed on this patient in December 1861. It was my thirtieth case of ovariotomy, and I quote its report entire as published in 1865, specially directing attention to the examination of the opposite ovary, and the laying open of a cyst of the broad ligament at the time:—

'A. H., a cook, single, fifty years of age, was admitted on December 14, 1861, under my care, into the Samaritan Hospital, having been sent to me by Mr. Miles, of Gillingham.

'*History.*—She was quite well until seven years ago. She then began to find that the abdomen was getting bigger, but she had very little pain, and did not suffer much in her general health. Three years and a half ago, she was tapped for the first time at the Salisbury Infirmary, and thirteen pints of thin fluid were removed. Up to this time the catamenia had been 'pretty regular,' but afterwards the quantity became less, and the intervals increased to three or four months. Seven months elapsed before a second tapping became necessary. She was then tapped by Mr. Miles, of Gillingham; and, after thirteen weeks, a third time. She has been tapped twelve times in all, the quantity increasing and the fluid becoming thicker every time. The last tapping was eight weeks ago, when thirty pints of fluid were removed in a private hospital where she was told that her case was too unfavourable for ovariotomy.

'*State on admission.*—Though emaciated, the general aspect is that of a cheerful, tolerably healthy person. The abdomen measures forty-four inches in girth at the umbilicus, and twenty-two inches from ensiform cartilage to symphysis pubis.

I examined her on the day after admission, and diagnosed a multilocular ovarian cyst, with some parietal adhesions, but without any unusual pelvic attachment. Considering that a menstrual period had ceased a week before her admission, that her size rendered immediate relief necessary, that each tapping would lessen the probability of success after ovariotomy, and that she was very anxious to have the operation performed, it was decided to operate without delay.

'The operation was performed on December 17, 1861; Dr. Parson administered chloroform. Dr. Marion Sims, of New York, Mr. Miles, jun., of Gillingham, and several other gentlemen were present. An incision was made five inches long over the linea alba, midway between the umbilicus and symphysis pubis, going through some of the cicatrices left by tappings. The principal cyst was so closely adherent here that careful dissection was necessary to separate it from the peritoneum, and the cyst was opened during the process and emptied. More extensive parietal adhesions were then separated by the hand, and some groups of smaller cysts emptied by breaking them down with one hand in the empty cyst while the other hand was occupied in gradually withdrawing the mass of emptied and broken-down cysts. The pedicle was short, but was easily secured by a clamp about an inch from the right side of the uterus, and the tumour was then cut away. On examining the left ovary, it was found atrophied, but a thin-walled single cyst, as large as an orange, was observed close to the uterus, within the folds of the left broad ligament. This was laid open by an incision and emptied. The wound was then closed by silver sutures, carried through the whole thickness of the abdominal wall, including the peritoneum. The clamp had been left on, and it was secured with the stump of the pedicle at the lower angle of the wound. The cyst walls and groups of small cysts removed weighed between nine and ten pounds; and they had contained about thirty pints of fluid, so that the entire weight of the tumour was nearly forty pounds.

'The progress after the operation was most satisfactory. The patient had so little pain that not even a single dose of opium or of any other medicine was either given or required. The pulse never rose above 96, and was generally about 80. The clamp was removed on the fifth day, the slough then being quite

dry and hard. The sutures were removed on the seventh day, when the wound was found to be firmly closed. The bowels acted on the ninth day, and on December 31 the patient was eating and sleeping well, and thoroughly convalescent. She left the hospital in good health, and has since worked well as cook in a large family.

'This case shows that even in late stages of ovarian disease, in a patient past middle-age, and after repeated tappings, ovariotomy may be performed with success. The chief peculiarity in this case was the small cyst found in the opposite broad ligament, after removal of one ovarian tumour. The cyst was so closely adherent to the uterus that it could not have been removed with safety; and as it is well known that thin-walled single cysts in this situation seldom refill after they have been emptied, I thought it not probable that, as it was freely laid open, it could lead to future trouble, and the event has proved this hope to have been well founded.'

In November 1867, Mr. Miles again wrote to me, stating that the patient upon whom I had operated six years before had lately returned from service with signs of a recurrence of the disease, having a cyst in the abdomen of about the size and shape of the womb at the sixth or seventh month of pregnancy. She was admitted to the Samaritan Hospital, November 15, 1867, giving her age as fifty-six. She said she had menstruated regularly up to the time of the first ovariotomy, and once a fortnight afterwards. It then ceased for a year; then she had a persistent discharge for a few weeks, and it then ceased altogether. She had felt perfectly well, and had acted as a cook until May 1867, when abdominal pain came on, followed by enlargement which gradually increased. The greater part of the abdomen was occupied by a fluctuating cyst, the abdomen being very hard and tender in the left iliac fossa. The cervix uteri, with its canal, was opened and dilated by a mucous polypus. This I drew down, and divided a small pedicle with scissors. The polypus was as large as a walnut. Bleeding was so free that it was necessary to plug the vagina. A fortnight afterwards, I tapped midway between the umbilicus and the right ilium, and drew off seven pints of viscid ovarian fluid. She was relieved by this, and went to the Convalescent Hospital December 13, 1867. She was readmitted January 25, 1868.

The cyst was then well defined, extending on the left side from the iliac region to the false ribs, on the right side, about half-way from the umbilicus to the spine of the ilium, and above, half-way between the umbilicus and the sternum. The cervix uteri was high up, and there was some offensive discharge from the vagina. Injections were used daily. The vaginal discharge ceased, and the cyst being fully as large or larger than before tapping, I performed the second ovariotomy on February 5, 1868. Chloromethyl was given by Dr. Junker. I made the incision parallel with the cicatrix over the linea alba, but an inch and a half to the left of it, and extending about an inch lower. Two vessels were tied before the peritoneum was opened. The cyst was exposed and tapped. The only adhesions were to a piece of omentum, which also adhered to the abdominal wall beneath the cicatrix and to a coil of intestine. These adhesions were easily separated. On withdrawing the empty cyst and a group of secondary cysts, the uterus was seen to be held up near the lower end of the cicatrix by the pedicle of the tumour removed in 1861. The cyst on the left side had a broad attachment behind and to the left of the uterus. There was not room to apply a cautery clamp without injury to the uterus, and I accordingly cut away the base of the cyst, tying all vessels which bled as I went on, and separating the extremity of the Fallopian tube from the part of the cyst to which it adhered, leaving a small portion of cyst wall closely adhering to the inner part of the tube and to the uterus. Very little blood was lost, but there were two ligatures on vessels in the abdominal wall, three on omental vessels, five or six on vessels in the cyst wall, and one on the separated end of the Fallopian tube and cyst.

The cyst weighed fifteen ounces and contained seven pints of fluid. It was a multilocular proliferous cyst with very vascular walls, the arteries being small, but numerous and tortuous, and many of the veins as large a crow quill. She went on well, although nervous, feverish, and subject to palpitation, afterwards explained by the discovery that she had a large secret supply of brandy. Yet she left for Gillingham twenty-eight days after operation, on March 5, 1868. On March 16, Mr. Miles wrote, 'Her appetite is good, pulse quiet, no wound, no abdominal tenderness. It is a remarkably successful case.' Two months afterwards—May 22, 1868—he wrote, 'About

three weeks ago I found that she insisted upon keeping her bed, although her tongue was clean, appetite good, pulse quiet and firm, and she had gained flesh. I thereupon, after very great obstinacy, got her to put on her clothes, and then in a few days to get downstairs and go out in a Bath chair, and she bears it all well, though not with a good grace ; but I wish to ask if you can account for the great craving for food which she has? She is most irritable if it is not brought the moment it is ordered by night and day. She makes a good deal of pale urine ; sp. gr. 1015, contains no sugar.' In reply I alluded to the amount of brandy she drank without my knowledge whilst in the hospital. And I heard again from Mr. Miles that 'she died on October 6, 1868,' just eight months after the second operation. Mr. Miles did not make any post-mortem examination, and registered the cause of death as 'aberration of mind and voluntary abstinence from food.' He afterwards informed me that she became quite fleshy, and able to walk three or four miles, until she began obstinately to refuse all food.

In one other case I went prepared to perform ovariotomy upon a lady whose right ovary I had previously removed successfully ; but I found the uterus and left ovary quite healthy, and a very thin-walled cyst attached only to the abdominal wall, as if it had arisen at a spot where some firm adhesions had been separated at the first operation. I emptied the cyst, laid it freely open, and saw the patient this year in good health.

The next case which I have to bring forward of operation performed twice on the same patient has peculiarities which require further remarks, and I reprint the account of the first operation as given in my volume of cases entitled 'Diseases of the Ovaries,' published in 1865 :—

'An unmarried lady, twenty-eight years of age, was sent to me by Dr. West on June 7, 1862. With the exception of menorrhagia, which had always been troublesome, she had been well until the preceding summer. She then had some pain low down on the left side, but it went away, and recurred more violently in November 1861. Pain and sickness became frequently troublesome, and were increased at the periods. In January 1862 Dr. West was consulted, and detected ovarian disease. The size continued to increase ; and, in March, Mr.

Paget removed six quarts of fluid by tapping, and injected iodine. Sickness and pain were severe for three days. She remained small for a month or six weeks, but had increased to about the same size as before the tapping. The girth was thirty-seven inches, length from sternum to pubes fifteen inches. The whole abdomen was filled by a non-adherent cyst, which appeared to be unilocular, or nearly so, from the extreme regularity of the fluctuation in all directions. It was found afterwards that this was owing to the tension of small cysts with very thin cyst-walls. The pelvis was free, but the uterus was elevated, drawing up the vagina like a long funnel.

'I advised ovariotomy without delay, and performed the operation on June 11, 1862. Dr. Parson gave chloroform; Mr. Bateman, of Islington, Mr. Pierce, of Notting Hill, and Dr. Savage were present. On opening the peritoneum by an incision between four and five inches long, extending downwards from an inch below the umbilicus, some small tense cysts with very thin walls were seen, emptied, and withdrawn. Some adhesions near the site of the tapping were then separated, and the whole tumour brought out. I then found that the tumour was quite closely attached to the right side of the uterus; there was nothing like a pedicle. I accordingly passed the chain of an écraseur above the Fallopian tube and below the round ligament, and tightened it quite close to the uterus. I then cut away the tumour, and afterwards pared down the stump nearly to the tight chain. I then loosened the chain, intending to tie any vessels which bled, but there was no bleeding. So the chain was removed, the pelvis cleansed, the left ovary found to be healthy, two small pedunculated cysts of the left broad ligament twisted off, and the wound was closed by two deep and four superficial sutures of platinum wire.

'There was no sign of hæmorrhage after the operation, but more opium than usual was taken on account of pain. Sickness also was troublesome on the second day. There was a little oozing of blood from one of the stitches at night and next morning, but it ceased spontaneously. Early on the third day the catamenia appeared and continued freely. After this she improved. On the sixth day, I removed the deep sutures. A little pus came from the track of each. Two days afterwards she was restless, and bilious vomiting recurred. I removed the

superficial sutures, a drop or two of pus following each, and a small slough was caused by the lowest; but the wound was quite healed. For the next three days she was restless, and there was free oozing of pus from two of the suture points; but she went out of town on June 30, with the wound quite healed, soon gained strength, was married in the summer of 1863, and a fine strong child was born in August 1864. Dr. King, of Camberwell, attended her, and informed me that the labour was perfectly natural.

'I used platinum sutures in this case, to ascertain if any advantage would arise from the use of a metal which would not oxidise like silver or iron, and remembering the use of platinum sutures twenty-five years ago by Mr. Morgan at Guy's Hospital. But I have scarcely ever seen so much suppuration in the track of the sutures as in this case; and it taught me to look to the size of the needle, the size and smoothness of the thread or silk, the tightness with which it is tied, and the time it is left, as having more to do with suppuration or sloughing than the material of which the suture is composed.'

Continuing the history of this case after the marriage in 1863, and birth of the first child in 1864, I have to add that a second child was born in February 1866, and the patient again became pregnant early in 1867. Up till this time the health had been very good, but then disease reappeared, so that she required tapping during the pregnancy. Another tapping followed, and in May 1868 her medical attendant, Mr. Griffith, wrote that 'she had no bad symptom after the tapping. The vomiting has ceased, and with the diminished abdominal tension I can feel what appears to be almost a solid substance of considerable size on the left side, similar to but larger than what I felt after the last tapping.' Towards the latter end of May the distension again rapidly advanced, the measurement at the waist increasing at the rate of three inches in ten days; but the general health continued good. She was again tapped in June, and the second operation, for removal of the second tumour, was undertaken on the 21st of the same month, 1869.

The incision was made parallel to, and half an inch to the left of, the cicatrix of the first operation, extending from the umbilicus to a point two inches above the pubes. A little

ascitic fluid escaped on opening the peritoneum, and a coil of intestine was seen, as well as a large piece of omentum, which adhered to the abdominal wall around the umbilical ring. On introducing the hand, and pressing the intestine and omentum upward, I brought a tumour forward and tapped a very thin transparent cyst. Two or three pints of clear serum escaped, and I then found a solid fibroid tumour to be closely attached to the upper and back part of the uterus. A coil of intestine and a piece of omentum which adhered to the tumour were separated from it, and the tumour was drawn outward. The chain of an écraseur was then passed behind the uterus around the neck of the tumour, avoiding the right ovary and right Fallopian tube, which were healthy. The chain was slowly tightened, and the tumour pared away near the chain. One omental vessel was tied, and the ligature returned with the omentum. Some stitches were then inserted to close the upper part of the wound, the chain of the écraseur being occasionally tightened. As it cut through there was free bleeding, and some vessels were tied on the posterior surface of the body of the uterus, and close to the left Fallopian tube, which had been divided.

When bleeding appeared to have ceased, the remaining sutures were applied and the peritoneal cavity carefully sponged. Some oozing of blood continuing, the uterus was again examined, and perchloride of iron was applied to part of the surface where there was some oozing. At length the wound was closed, the sutures being passed so as to include the opening at the umbilical ring, and two others beside the cicatrix, where there had been hernial protrusion.

The patient had been one hour and five minutes from beginning to inhale methylene until she was carried to bed. There was some sickness during the operation, and it continued afterwards, though during the first day there was no other bad symptom. She soon, however, began to show signs of failing power, and died sixty-six hours after the operation.

At the post-mortem examination five or six ounces of bloody serum were found in the peritoneal cavity, and some of the small intestines were slightly adherent from recent exudation of fibrine. The uterus and other parts were sent to Dr. Wilson Fox for examination, whose report runs as follows:—'The

tumour is, I believe, a fibro-sarcoma, with a large proportion of cells like organic muscular fibres, but others are mere fibre cells. Besides these there are a great number of round and oval-shaped nuclei. The tumour has under the microscope a minutely lobed character; i.e. it is traversed by septa in all directions, and in the septa the muscular fibres, and also the fibre cells, are the most abundantly accumulated. The section is everywhere opaque, and glistening and firm; a few striæ of fatty degeneration are seen in spots only. Parts of the tumour are breaking up into a reticular structure, in the meshes of which a clear serous fluid is contained. Various cysts, from the capacity of a large walnut to that of a hazelnut, are also scattered through it, in addition to the larger ones opened before. As to whether this tumour represents a sarcoma of the ovary, I am not prepared to pronounce a positive opinion; but in some parts there are little cavities with well-defined walls, which look as if they might be the remains of the Graafian follicles, but the walls are completely changed by the fibro-plastic growth, and their lining does not show any remaining distinct traces of the membrana granulosa. They appeared empty, and two or three times the size of the ordinary Graafian follicles. The amount of muscular tissue present is not, I think, enough to invalidate an ovarian origin. The general character of the tumour is unlike the fibroids of the uterus which I have seen, but I have not made these latter the objects of a sufficiently comprehensive study to be able to speak positively on this point. If the tumour is ovarian, as I am inclined to think, there would appear to be a double source of cyst formation in it—one, the liquefaction or breaking down into cavities, such as is seen in the whole class of these tumours; and the other, from enlarged and altered Graafian follicles.'

During the operation, besides the tumour, I found in the abdominal cavity a free, spheroidal body, measuring two inches in its long diameter, and an inch and a half in breadth, and three-quarters of an inch in thickness. Its weight was 241 grains. It was semi-elastic, of dark brownish-yellow colour, and the surface was smooth and shining. It consisted entirely of fat and cholesterine crystals, and had an exceedingly delicate investment of connective tissue, with fascicles of nucleated

fusiform cells and elastic fibres. This body was evidently one of the appendices epiploicæ, which had separated from its pedicle, and had remained some time free in the abdominal cavity.

During the subsequent attendance with Dr. Griffith, in 1862, doubt arose, which my memory did not enable me to clear up, whether I had been right in describing the *right* ovary as having been removed at the first operation; and the second operation not only justified the doubt, but also suggested the question—which even the examination of the tumour by Dr. W. Fox did not solve—whether the tumours in either operation were really ovarian, or fibro-cystic, or fibro-sarcomatous growths, originating in the uterus and only involving the ovaries. A case such as this, which, produced without a retouch from the note-book, not only shows the difficulties of diagnosis encountered in the emergencies of practice, but proves how perplexing, even in the deliberate investigations of the accomplished pathologist, some of the obscurer forms of disease may become, should tend to moderate any captiousness of criticism in matters of practical surgery, and open up the way to more minute and recondite research into the origin and forms of morbid changes.

Some writers on ovarian disease have asserted that the right ovary is much more frequently diseased than the left, and that coexisting disease of both ovaries is extremely rare. But, on examining the grounds for these assertions, we find that they are principally based upon examination of patients during life, or patients who have not been submitted to ovariotomy.

When we come to examine the result of post-mortem examinations we find (as a very little reflection would lead one to expect) that, as there is no anatomical or physiological reason why the right ovary should be more frequently affected than the left, so, in fact, one ovary is found to be diseased as often as the other.

Of 80 cases collected by Dr. West from Scanzoni, Lee, and his own notes of post-mortem examinations, in 28 the disease was on the right side, in 26 on the left side, and in 26 both ovaries were diseased—so that in about one-third of the cases both ovaries were diseased. In 1865 Scanzoni

again drew attention to this subject in the Würzburg 'Medicinische Zeitschrift.' In a paper 'On the Relation of Disease of both Ovaries to the Ovariotomy Question,' he gives the result of an examination of the reports of post-mortem examinations for the previous fourteen years by his colleagues Virchow and Förster. These records were examined with the sole object of ascertaining in how many cases one or both ovaries were diseased—and in 99 cases of ovarian disease it was found that in 48 one, and in 51 both ovaries were diseased—so that in more than half the disease was on both sides. The tendency to disease of both ovaries appears to be greater before the age of fifty than in older women. Of 52 women under fifty, both ovaries were diseased in 31; one ovary only in 21 (59 per cent. to 40); of 44 women above fifty, both ovaries were diseased in 17 only, while one ovary was diseased in 27. Thus, under fifty, we had both ovaries diseased in 59 per cent.; above fifty, only in 38 per cent.

But it must be remembered that any conclusion drawn from post-mortem examinations would in all probability differ very widely from results observed in ovariotomy. The first series of facts shows what may be expected when ovarian disease has proceeded to its natural termination, or has only been modified by palliative treatment. The other series shows what may be expected when the patient is subjected to radical treatment before the disease has advanced to its latest stages. All observation tends to the conclusion that disease begins in one ovary and advances to a considerable extent in that ovary before the other is affected, and that in about half of the cases it proceeds even to its fatal termination without any disease occurring in the opposite ovary.

If, then, in only about half of the cases where ovarian disease has reached its *latest* stage, disease of both ovaries is found, we might expect that in *earlier* stages of the disease both ovaries would be much less frequently affected; and, so far as my observation has gone, this is the fact. In the 500 cases in which I performed ovariotomy I only removed both ovaries in 25 cases. In a few other cases the ovary not removed presented some indications of disease in a very early stage, but not sufficient to warrant its removal.

It is not improbable that in some of the earlier cases slight

disease of the opposite ovary may have been overlooked; but, making every reasonable allowance for such error, it is not probable that when ovariotomy is performed both ovaries will be found diseased in more than six per cent. of the patients. Scanzoni thinks that as both ovaries have been so seldom removed (he finds only 25 on record), operators must either have overlooked disease of the second ovary or thought it insignificant, or believed that the removal would add too much to the danger. Of the 25 cases collected by Scanzoni 11 only recovered, and 14 died, a mortality of 56 per cent.; whereas, of 468 cases, where only one ovary was removed, the mortality was only 44 per cent. The results of my own experience may be seen in Chapter XVII. Of the 25 cases there recorded, 11 died and 14 recovered.

As to the frequency with which, after successful ovariotomy, the ovary not removed, but examined and found healthy, becomes diseased, besides the case just related three others have come under my notice.

In my second case, operated on in 1858, the patient remained well for seven years. Then disease of the opposite ovary appeared, so evidently of a malignant character, that no operation was thought of, and soft cancer was found after death.

In the third case, also operated on in 1858, the patient died of peritoneal cancer ten months after operation, and disease had commenced in the remaining ovary, which was enlarged to the size of an apple.

In my forty-third case, operated on in 1862, disease of the opposite ovary came on two years afterwards, and was treated successfully by vaginal tapping and drainage. The patient remained well till 1872, when Dr. Sadler, of Barnsley, had again to give relief by vaginal tapping. I have not heard of any other of my patients in whom disease of the second ovary has appeared after successful removal of the first, except the cases just related.

CHAPTER XIX.

ON INCOMPLETE OVARIOTOMY AND EXPLORATORY INCISIONS.

When I began to publish every case where I had completed the operation of ovariotomy, and published in separate series cases where the operation was commenced but not completed, and cases where an exploratory incision only was made, I had to reply to objections advanced by critics who considered that the fatal cases ought to be counted among the unsuccessful cases of ovariotomy. If I asked whether the cases which recovered from the operation when only part of the cyst had been removed, or when a cyst had been simply emptied, should be counted among the successful cases, the answer was, Certainly not, because ovariotomy had been only attempted, and the attempt had failed. One great reason why ovariotomy was so long before it was received at all cordially by the profession was, that incomplete cases, or cases of simple incision, had been classed among cases of ovariotomy, while unsuccessful cases were left unpublished. In the so-called statistical tables, cases of complete and incomplete ovariotomy and of exploratory incisions were so grouped together that it was impossible to ascertain, without a good deal of inquiry, what were the real results of even the published cases. I thought the best way of avoiding this error would be to give a truthful and exact account of every case in the order of its occurrence, showing how frequently the attempt to remove an ovarian tumour had been made, how often it had succeeded, what were the results of completed operations, how often the attempt had been only partially successful or had failed, what were the results of incomplete operations, how often diagnosis had been so doubtful that an exploratory incision was necessary before the doubt could be solved, and what risk the patient incurred by submitting to an exploratory incision. This plan appeared, and still appears to be, better calculated than any other to present a true

picture of the occurrences of actual daily practice, and I think the two following tables, which include every case where I have attempted to perform ovariotomy, but have not completely succeeded, or have made an exploratory incision either to satisfy my own doubts or those of others, or in compliance with the earnest solicitation of a patient, will give the reader a far better opportunity of forming a correct estimate of the real results of ovariotomy than if the fifty-four cases which they together contain had been included among the completed cases of ovariotomy. The proportionate mortality would have been slightly increased; instead of 500 cases, with 127 deaths, and a mortality of 25·4 per cent., we should have had 552 cases, with 146 deaths, and a mortality of 26·44 per cent.—a difference of not much more than one per cent.—while discredit would have been thrown upon the whole series of cases by the manifest fallacy that cases were enumerated as ovariotomy where the operation had only been begun and could not be finished, and that the patients who recovered from the operation were not cured of the disease even if they gained some temporary benefit. By correctly classifying all the cases as I have done in three series, it appears to me that all possible objection is removed. It is seen that while in some fourteen years the operation of ovariotomy has been completed by me five hundred times, it has during the same period been found impossible to complete it in twenty-eight cases, and in twenty-four other cases exploratory incisions were necessary to perfect diagnosis. The particulars of all these cases are presented in the two following tables.

In the first table the particulars of every case in which I have made an exploratory incision, from the first in 1860 to the twenty-fourth in 1872, are given nearly in the same form as the cases of completed ovariotomy. On looking over the table, I find that in almost every case doubts or suspicions entertained before the incision was made were confirmed, and I scarcely recollect a case where an exploratory incision was thought to be necessary and which proved to be an ordinary case of ovarian disease. Occasionally after commencing by an exploratory incision I have found it possible to remove an ovarian tumour, but there has always been some peculiarity in the case which led to this unusually cautious mode of procedure. Any-

one who will carefully study the chapter on diagnosis, in the earlier part of this volume, will find, I think, good reason for believing that the diagnosis of ovarian tumours, and of the conditions favourable or otherwise for operation, is already as well established as that of any other form of disease requiring surgical operation. No surgeon about to attempt to relieve a strangulated hernia can foresee exactly the conditions he may meet with; the lithotomist may find a larger or smaller stone than he expects; aneurism is not always cured by the ligature of the artery supposed to be involved; and mammary tumours supposed to be malignant are found not to be so in some cases after removal, or those supposed to be innocent prove to be malignant. Indeed, throughout all surgery we share with the physicians the difficulty of practising the *ars conjecturalis*, and it is no reproach to a surgeon if, acknowledging doubt, he endeavours to clear up that doubt by commencing his operation with an exploratory incision. The fact that only twenty-four cases of exploratory incision have occurred during the period in which I have completed ovariotomy five hundred times proves, on the other hand, that in a large majority of cases an accurate diagnosis may be made even without an exploratory incision. With our present knowledge it is almost incomprehensible that Dr. Frederick Bird should have been compelled by Mr. Cæsar Hawkins to acknowledge that, in addition to the few cases of ovariotomy which he had completed and published, he had also made exploratory incisions, or had commenced the operation and had failed to complete it, in about forty other cases which he had neither published nor alluded to until questioned by Mr. Hawkins. And there can be no doubt that if a surgeon for every case of completed ovariotomy must necessarily encounter such difficulties that he would be compelled to leave several cases incomplete, or meet with such insuperable difficulties in diagnosis that he could only satisfactorily clear them up by an incision, it would be a very grave objection to the principle of the operation. Happily, with advancing knowledge doubts are being cleared up and difficulties lessened, exploratory incisions are becoming less frequently necessary, and incomplete are bearing a diminishing proportion to completed operations.

Of these twenty-four patients seventeen recovered from the

Cases in which an Exploratory Incision was made.

No.	Medical Attendant	Date	Age	Condition	History, etc.	Result
1	Mr. Brown, Stourport	1860, Sept.	38	Married	Found the extensive attachments suspected, and simply tapped.	More relieved than by tapping, but died of natural progress of disease after fifteen days.
2	Hospital	1861, Oct.	30	Single	Found the close attachments to bladder which had been suspected before the incision was made.	Recovered; has been tapped four times since.
3	Hospital	1862, Feb.	37	Married	Found very firm parietal adhesions, as suspected. Tapped several cysts.	Died a week afterwards from inflammation of lining membrane of cyst.
4	Mr. S. Haden	1862, Dec.	22	Single	Fluid of tubercular peritonitis evacuated by small incision.	Recovered. Is now in good health.
5	Hospital	1864, May	39	Married	Cyst ruptured spontaneously; ovarian fluid removed from peritoneal cavity by small incision.	Recovered. Was tapped several times before she died.
6	Hospital	1866, Aug.	38	Married	Nineteen pints of ascitic fluid removed, and a malignant tumour exposed, involving uterus and ovaries.	Relieved, but died a few weeks afterwards.
7	Hospital	1866, Dec.	39	Married	Much ascitic fluid removed; solid tumour of uterus exposed and punctured.	Relieved, but died some months after.
8	Hospital	1866, Dec.	43	Married	Renal cyst exposed and tapped. See *Dublin Quarterly Journal*, Feb. 1867	Death in 30 hours. Uræmia.
9	Dr. Churchill, Dublin	1867, Aug.	48	Married	Large uterine fibroid exposed; punctured; bleeding vessels stopped by cautery and perchloride of iron.	Suppuration went on for several months, a drainage tube being fixed in the lower angle of the wound. The patient died in 1871.
10	Dr. Evans, Birmingham	1867, Oct.	43	Single	A fatty tumour of mesentery, exposed by incision, and wound closed.	Recovered from the incision. The tumour was afterwards removed. (See *Pathological Transactions*, vol. xix. p. 243.)
11	Dr. Symonds, Clifton	1867, Nov.	50	Single	A fibro-cystic tumour of the uterus; 7½ solid, 16½ fluid removed.	Died 3rd day.
12	Mr. Keyser	1868, Feb.	30	Married	A renal or splenic cyst exposed, tapped, and drained.	Recovered, and remained well, but is since dead.
13	Dr. Garrod	1868, Feb.	58	Married	Eight pints of sero-purulent fluid removed from a fibro-cystic uterine tumour, after exposing the tumour by incision.	Recovered, and remained well two years, but died in 1872.

14	Hospital	1868, Aug.	51	Widow	Incision made to examine a tumour surrounded by ascitic fluid; the fluid removed, but no attempt was made to remove a tumour, apparently cancerous, involving uterus and both ovaries.	Died 10th day.
15	Dr. Williams, Sudbury	1868, Nov.	32	Single	Renal cyst exposed, tapped, and drained.	Recovered; in May 1872, in excellent health.—Married September 1870.—Child born June 1871.
16	Mr. Turner, Manchester	1869, June	24	Single	A large solid glandular or fibro-plastic tumour exposed, but not disturbed.	Recovered and returned home—but died 13 months after.
17	Hospital	1869, Nov.	25	Married	Ascitic fluid removed.—Small tumour of left ovary and large uterine fibroid, not disturbed.	Recovered, and left hospital on 17th day.
18	Hospital	1870, Feb.	30	Married	45 pints ascitic fluid removed.—Papilloma of both ovaries involving uterus, not disturbed.	Died 40 hours after incision.—The tumour apparently sprang from the peritoneal coat of the uterus.
19	Hospital	1870, Feb.	36	Married	A fibro-cystic tumour exposed, and examined. Perchloride of iron and twisted suture used to stop bleeding from large veins.	Died, 8th day.—Uterus and ovaries healthy. The tumour, a fibro-plastic growth, originating in the serous membrane, and involving intestines, omentum, and liver.
20	Mr. Lowe, Lynn	1870, March	44	Married	Peritoneal fluid evacuated by a small incision.—Cystoid cavity formed by adhering coils of intestine and thickened peritoneum.	Recovered, and was well in 1872.
21	Hospital	1870, June	43	Married	An incision made to complete diagnosis, and a fibroid tumour of the uterus was not disturbed.	Recovered from incision.—Left Hospital 23rd day.
22	Hospital	1870, Dec.	35	Single	Patient moribund with dyspnœa and anasarca. Incision made to ascertain nature of abdominal tumour.—Fibro-plastic growth not disturbed.	Relieved by drainage of serum from cellular tissue, but died two months after.
23	Hospital	1872, Jan.	15	Single	Renal cyst emptied and drained. See chapter on 'Renal Cysts.'	Died 4th day.
24	Dr. Sutton, Dover	1872, June	42	Married	Ovarian cyst tapped and emptied, but not separated from a large fibroid uterus, to which it was universally adherent. Wound closed.	Recovered from operation.—Returned to Dover.

Cases in which Ovariotomy was Commenced, but not Completed.

No.	Medical Attendant	Date	Age.	Condition	History, etc.	Results
1	Hospital	1857. Dec.	28	Single	Incision made, and intestines found anterior to tumour.	Recovered from incision, and died 4 months after from spontaneous rupture of cyst into peritoneal cavity.
2	Dr. Jones, Dalston	1860. Oct.	21	Single	Abandoned, from extent and closeness of parietal adhesions.	Recovered, and was tapped seven times afterwards; she died a year after.
3	Hospital	1862. Oct.	46	Married	Abandoned, from connections around brim of pelvis, and to uterus and bladder.	Partially recovered, but died 3 weeks afterwards of rupture of a cyst into peritoneal cavity.
4	Mr. Reece, Cardiff	1864. Jan.	33	Married	Adherent multilocular tumour; not completely removed.	Died in 23 hours.
5	Hospital	1865. Feb.	22	Single	Pelvic adhesions; cyst emptied and fixed to abdominal wall; cure by suppuration.	Recovered, and remains in good health in 1872.
6	Hospital	1865. May	50	Married	Pelvic adhesions; loose part of cyst removed by écraseur.	Died in 76 hours. Obstructed intestine.
7	Mr. Soden, Bath	1865. Oct.	40	Single	Pelvic adhesions; cysts tapped and emptied.	Recovered after suppuration, but did not live many months.
8	Hospital	1866. April	38	Married	Uterus and both ovaries diseased; part of a tumour of doubtful origin removed. See *Pathological Transactions*, vol. xvii. p. 203.	Death in 32 hours. Peritonitis.
9	Dr. Oldham	1866. July	40	Married	Suppurating cyst opened and partially removed.	Death in 14 hours. Exhaustion.
10	Dr. A. Farre	1866. Dec.	33	Single	Cyst exposed and tapped; adhesions so extensive that no attempt at removal was made.	Relieved. Died two years after.
11	Dr. Perkins, Exeter	1867. April	48	Single	Incision made, and ovarian cyst emptied, but no attempt to remove the cyst was made on account of extensive adhesions in pelvis and to cæcum.	Recovered as from a simple tapping. Feb. 1, 1869, Dr. Perkins writes: "Her general health is tolerably good. I have tapped her 23 times in the last 21 months. Average, 11 pints." Died in April 1869, after draining.

12	Hospital	1867. April	26	Single	Ovarian tumour exposed and tapped, and one cyst emptied. Bleeding vessels in cyst were tied, and the ligatures were cut off short, and returned with the cyst.	Died on the 19th day, after suppuration of the cyst. P.-M. examination proved that the tumour could not have been removed.
13	Hospital	1867. May	43	Married	Cyst opened; some adhesions to parietes and intestines separated. Two vessels tied, and ligatures returned.	Died, 52 hours. The uterus, rectum, and both ovaries were so united that they could only be separated after death by careful dissection.
14	Chester Infirmary	1868. May	25	Single	Ovarian cyst exposed and emptied; no attempt made to remove it, owing to extensive pelvic adhesions.	Relieved; left the hospital; but died a few weeks afterwards.
15	Hospital	1868. June	47	Married	Part of an adhering cyst removed; the remainder fixed to opening in abdominal wall, in the hope of a cure by suppuration and drainage.	Died, 4th day.
16	Mr. O'Connor, March	1868. Aug.	33	Married	Ruptured cyst; peritoneal cavity cleansed from ovarian fluid; no attempt made to remove adherent dendritic tumour.	Recovered; went to March a fortnight after the operation; tapped by Mr. O'Connor in September and October; no collection of fluid after October, but some drainage of pus. January, 1869: "Has gained flesh, and is improving in health."
17	Dr. Worms, Paris	1868. Oct.	33	Married	Adhering cyst emptied, fixed to abdominal wall, and drained.	Suppuration and recovery, without dangerous symptoms. In February, 1869, in good health, though a few drops of pus still escaped daily. Died in 1871, after re-formation of fluid and tapping.
18	Dr. Royston	1869. Feb.	53	Widow	An adherent multilocular ovarian cyst opened, fixed to the abdominal wall, and drained.	Died, 20th day.
19	Mr. Jones, Epsom	1869. Feb.	54	Single	Peritoneal fluid removed, and a burst adherent cyst completely emptied. Nothing more done, as cancerous nodules were scattered all over the peritoneum.	Died, 3rd day.
20	Hospital	1869. May	34	Married	Peritoneal fluid removed; adherent papilloma of both ovaries left undisturbed.	Left hospital, 25 days after.

Cases in which Ovariotomy was Commenced, but not Completed.

No.	Medical Attendant	Date	Age	Condition	History, etc.	Results
21	Mr. Erichsen	1869. May	54	Single	Part of a large adherent multilocular cyst removed; adhering pelvic portions left, ligatures maintaining drainage.	Died, 8th day.
22	Dr. Bacelli, Rome	1870. Nov.	31	Married	Part of an adhering cyst removed; remaining portion secured by ligature, the ends keeping up drainage.	Died, 22 hours.
23	Dr. Budd, Clifton	1870. Dec.	26	Single	Adherent cyst of right ovary or broad ligament opened, emptied, fixed to abdominal wall, drained, and cure obtained by suppuration.	Recovered. Well in 1872.
24	Dr. Wane	1871. Aug.	63	Married	Ascitic fluid and contents of two cysts removed; papilliform masses, involving uterus, both ovaries, bladder, and rectum, undisturbed.	Died, 15 days after.
25	Mr. Coe, Bristol	1871. Nov.	42	Widow	Multilocular cyst emptied and partly removed; the remainder adherent to the rectum, uterus, and pelvis generally, stitched to the opening in the abdominal wall, which was partly left open for drainage.	Died, 10th day.
26	Dr. Barclay, Leicester	1871. Nov.	43	Married	A burst cyst, and ovarian fluid free in peritoneal cavity partly removed; the lower segment of the cyst, generally adherent behind the uterus, stitched to the lower edges of the wound and drained.	Died, 3rd day.
27	Dr. Millington, Wolverhampton	1872. Jan.	55	Married	Ascitic fluid removed; a cyst emptied. Nothing more done. Nodules of cancer covering the whole peritoneum.	Recovered from operation, but died of cancer of rectum 10 weeks after.
28	Hospital	1872. April	27	Single	Peritoneal fluid removed; bunches of thin grape-like cysts drawn out. Part of a large cyst firmly adherent in the pelvis not separated, but secured outside by a large clamp.	Died, 11 days after.

incision or were relieved by it; in seven cases death followed from three to ten days after incision. In two recovery appears to have been permanent and complete. In others the disease has gone on very much as if the patient had been only tapped; the patients have been as much or more relieved than by tapping, but not permanently cured.

The cases grouped in the second table, twenty-eight in number, might perhaps have been included in the same table with the cases of exploratory incision, as in many of them difficulties were anticipated, and an exploratory incision even proposed, but in almost all something more than an incision was made, and in some the operation was commenced with the expectation of completing it, not anticipating the difficulties which arose. In all cases of exploratory incision some unusual difficulty was recognised and provided for. The second table includes cases where nothing unusual was foreseen or where something more than an exploratory incision was carried out, such as separation of adhesions, emptying or partial removal of the cysts.

Of the twenty-eight patients death was hastened by the operation in eleven or twelve, they having died at various periods from one to eleven days afterwards. Others were neither more nor less relieved than they would have been by an ordinary tapping. In some the natural progress and termination of the disease were neither hastened nor checked, in some life was certainly prolonged, and in some recovery appeared for a time to be complete.

In three cases none of the cyst was removed, but a permanent opening was kept up, and a cure obtained after suppurative inflammation, which in the following case was complete.

Early in December 1864, I was asked by Mr. Nicholson, of Stratford Green, to see a housemaid 22 years of age, and single, who was suffering under ovarian disease. A tumour was felt occupying the lower part of the belly, and rising four or five inches above the umbilicus. It was not tender on pressure; fluctuation in it was perceptible, but was not very distinct. The patient had commenced to menstruate at the age of fourteen, and had always lost a good deal of blood every fortnight. The uterus was high and rather far back; the cervix was moveable; while a soft elastic tumour was to be felt

depressing the anterior wall of the vagina. On the father's side the patient came of a strong family, her mother had, however, been delicate. She herself had at one time been supposed to have a hernia on the right side. No trace of it was felt.

About eight months before I saw her the patient was much troubled with pain in the right hip, and shortly afterwards she discovered a small tumour in the lower part of the abdomen. For six months symptoms of pressure on the bladder supervened occasionally, and pain and numbness continued in the right leg. The tumour increased slowly at first, and then more quickly, until it reached the size already mentioned. The patient was advised to wait before anything was done. On New Year's Day, 1865, she had a smart attack of pain in the right thigh, and three days later I felt some recent lymph over the anterior surface of the tumour.

The patient was admitted to the Samaritan Hospital on January 17, 1865. The catamenia had just come on. When they ceased—after some consultations rendered necessary by a questionable state of the apex of the right lung—it was decided not to delay ovariotomy by any preliminary tapping, and on February 6, 1865, Dr. Parson having chloroformed the patient at 3 P.M., Drs. Dehn, of Hamburg, Marion Sims, and Mr. Wright, of Nottingham, being present, I made an incision from one inch below the umbilicus downwards for five inches. There were no adhesions anteriorly, but after tapping the principal cyst, and emptying it of several pints of fluid containing much blood, its attachments to the brim of the pelvis and to the right side of the uterus were found to be so close that I resolved not to attempt their separation, but to replace the empty cyst. There was, however, such free hæmorrhage from the opening into the cyst made by the trocar, and even from the little punctures made by the hooks which seized the cyst wall, that it was obviously unsafe to return it; and I transfixed the edges of the external parietal wound, and of the cyst wound, with a hare-lip pin, and secured them together with a twisted suture. The rest of the abdominal wound was closed with four deep silk sutures above the pin, and one below it. The patient rallied well; pain was not excessive. Twenty drops of laudanum were given at 5. At eight she was easier

than she had been, but the skin was hot; the tongue very dry; the lips parched; the pulse 120; respiration 52. A pint of clear urine was drawn off. I thought of bleeding, but resolved to wait for two hours to see whether perspiration would break out, the aspect being good and the state of the urine favourable. At 10.30 the patient was found to have been sick; the pulse was 136, the respiration 52. At 10.45 I bled to 10 oz. rapidly in a full stream. At 11 the pulse was 124, the respiration 48; the face rather pallid; the pulse still incompressible, although fuller than before the bleeding. At 12.20 the pulse was 124, the respiration 40. Next day the face was flushed, and the tongue still parched; the skin, although hot, was moist; the pulse, 120; respiration, 28. I cut away the thread around the pin, but left the pin itself. On the second day the patient was much better; her pulse was only 116. The stitches were removed in due time, and a very free discharge of serum gradually set up, just at the point where the cyst had been pinned to the cyst wall. Convalescence progressed, and on February 26 the patient was sent to Eastbourne. I next saw her on May 11. There was then a very little discharge from the bottom of the cicatrix, and a slight hardness and elastic swelling felt per vaginam. The abdominal tumour had disappeared. She returned to her situation, and I saw her again in July in excellent health, the catamenia being regular, and with a very slight moisture only at the lower end of the cicatrix.

She became servant in a family at Camberwell, where she remained in excellent health, and called on me quite strong in February 1868. I saw her early in 1872 in excellent health.

In the case numbered 17 in the table, the patient was in good health for nearly three years after the operation, and then died almost immediately after a subcutaneous injection of morphia in Germany; and in case 23 a careful examination, in July 1872, failed to detect any trace of the cyst.

The painful position of a surgeon who has laid bare an ovarian tumour, has partly emptied it, has possibly separated some adhesions, and then begins to fear that he cannot completely remove the tumour, can only be estimated by those who have unexpectedly found themselves in similar difficulties. If

the difficulty is recognised early, and the cyst only exposed and emptied, the patient is scarcely in a worse condition than after tapping. Indeed, the incision leads to the avoidance of some of the dangers of tapping; the surgeon can see what vessels he wounds, and he can close the opening in the cyst if he pleases, while a short incision in the abdominal wall can by itself add little to the risk submitted to by the patient. But if extensive adhesions have been separated, the surgeon is tempted at any risk to complete the operation by the feeling that he can hardly leave his patient in a worse state, and that her only hope is in his boldly following out his intentions. In the very first case in the above table the patient recovered from the incision, died four months afterwards from spontaneous rupture of the cyst into the peritoneal cavity, when it was found that there would have been no insuperable difficulty if the operation had been proceeded with. On the other hand, post-mortem examination has shown that some of the tumours could not have been removed during the life of the patient, as they could only be separated after death by careful dissection.

In any case where difficulty threatens to be insuperable, rather than persevere at any risk, the surgeon acts more prudently if he proceed after the manner described at p. 470. In this case the cyst-opening and wound were closed, but afterwards opened, and no return of the disease has appeared since the operation seven years ago. In the cases where drainage proved so successful, complete recovery following suppuration, a drainage-tube or catheter was fixed in the empty cyst and brought out through the wound, which was closed around it at the time of operation.

CHAPTER XX.

RESULTS OF OVARIOTOMY, AND SUBSEQUENT HISTORY OF PATIENTS WHO RECOVERED.

The fact that of five hundred women who have had one or both ovaries removed, three hundred and seventy-three have recovered from the operation, is alone sufficient to justify the principle of the operation, and to prove that the mortality—namely, 25·4 per cent.—is smaller than that of many capital operations which are constantly performed without hesitation in suitable cases. And when we consider that a patient from whom one ovary has been removed can scarcely be said to be mutilated, as she is perfectly capable of fulfilling all the duties of a wife and mother, menstruating regularly, and bearing children of both sexes, without any unusual suffering either during pregnancy or labour, all doubt as to the 'legitimacy' of ovariotomy must be at an end. And the operation ought to be accepted as a more certain means of saving life from threatened death, restoring the sufferer to perfect health, and rendering her more apt for all the requirements of daily life, than in the case of a patient who recovers after almost any other surgical operation.

Fears had been expressed that when a patient recovered after ovariotomy she would in some way or other suffer in after life, that she would not menstruate regularly, that, if she married, she would not have children, or children of only one sex, that she would become excessively fat, or lose her feminine appearance and her sexual instinct, or that her life might be shortened by some disease originating in the operation or its consequences either upon some bodily organ or upon the mind. In order to ascertain how far any of these fears were well founded, or were exaggerated, or were purely imaginary and destitute of foundation, I asked every patient who recovered to write to me once every year, on the anniversary of the

operation, giving me full information as to her state. Nearly all promised compliance, and a few have written several years in succession. Many have written once or twice, some I have occasionally seen; but there were so many of whom I could obtain no information that in May and June 1872, I sent a circular to every patient who had recovered after ovariotomy in my practice, or to the medical friend by whom she was sent to me, asking for information on the following points, and in this form:—

Name of Patient.

Date of operation.

Present state of health.

If married since—when?

Is husband still alive?

If any children—

Date of Births.

Sex of children.

Anything unusual in—

Pregnancy,

Or Labour.

If dead, cause and date of death.

Any other information connected with the operation or the Patient which may seem important.

*Signature*_____

*Date*_____

From circulars returned to me, and from other sources, I am able to say that 35 women who were unmarried at the time of the operation have married since, that 14 have had one child, 6 two, 3 three, and 3 four children. Two have had twins. Of 259 women who were married when the operation was performed, 23 have had one or more children since. Of 25 I could obtain no information. The circulars were returned through the post-office, marked 'gone away' or 'not known.' 310 were in good health in 1872, many of them

adding that they were well and strong, or better than they had been for many years, or some such phrase, expressive of their complete restoration. A few complain of some trifling ailment, and a few have died at various periods of disease, in some connected, in others not in any way connected, with the operation.

I have not been able to trace any peculiarity in the subsequent condition of patients who have recovered after removal of both ovaries as compared with those from whom only one was removed, except that in only one case has there been anything like menstruation after recovery. One young unmarried woman became very florid and stout; but I have seen nothing like the excessive corpulence anticipated by those whose expectations were based on the results of castrating domesticated animals. Dr. Jackson, of Sheffield, has favoured me with the particulars of a case where he removed both ovaries, in 1868, from a married woman twenty-seven years of age. She had been married nine years, had menstruated regularly, but had had no children. She was rather thin, but healthy in appearance. The abdominal swelling had been observed about two years. Both ovaries were removed, and the patient recovered rapidly. 'At about the menstrual period, on three occasions,' writes Dr. Jackson, 'she had pains in the back, headache, and bleeding from the nose. This ceased, and she has since at the periods had headache and hot flushes in the face, terminating in a smart attack of diarrhœa, after which she felt quite well. The sexual appetite was absolutely *nil* for about two years, but on questioning her lately she said it has slightly returned. She has gained weight since the operation, probably to the extent of four stones. She is in the enjoyment of perfect health.' I have ascertained from the husband or medical attendant of some of my own patients that sexual desire and gratification have certainly not been less than before operation. In some cases, where only one ovary was removed, desire has been increased. One husband told me that his wife had been remarkably cold before ovariotomy, but was afterwards extremely amorous. In several patients whose menstruation before operation had been painful and irregular, it became quite regular and normal afterwards. Two who had been married some years, but were childless, have had children since. One very clever woman, on being

questioned by an old medical friend interested in the physiological question, said that since the operation she had 'felt more like a man than a woman.' And being asked to define her meaning, replied, 'Formerly I was passive; now I am aggressive.'

To the best of my knowledge and belief this is the first time that any such extended inquiry into the subsequent history of patients who have recovered from a capital operation has been carried out. As a rule, in all statistical returns from hospitals, the bare fact of death or recovery is all the information that is given, and any attempt to follow up the successful cases afterwards is found to be excessively difficult. Some years ago, I endeavoured to ascertain what became of patients who recovered after amputation of the thigh. I had good reason for believing that many died within a year, but was never able to obtain anything like correct statistical information. The hospital reporters of the 'Lancet' once collected together particulars of all the cases in which amputation at the hip-joint had been performed for several years in London hospitals. A large proportion of the patients died within a day or two of the operation, and of those who recovered, the only one who was alive a year after operation was a woman whose thigh I removed at the hip-joint, in the Samaritan hospital, on account of malignant disease. It is well known that patients who have been cured of aneurism, either by ligature or compression, are very apt to suffer from the disease in some other artery, but it is left to some future inquirer to ascertain the frequency and date of such return of disease. We have a little more information as to patients who undergo lithotomy a second time, but most of the information ends with the immediate result of the operation, and but little is known of the subsequent history of the patient. I hope that what has been done in this respect with regard to ovariotomy will not only be useful in enabling us to form a correct estimate as to the value of this operation, but will induce other surgeons to obtain similar information as to the subsequent history of patients who recover after amputation of a limb, excision of a large joint, lithotomy or lithotrity, ligature of main arteries, herniotomy, or trephining.

When a surgeon has removed a large diseased ovary and the woman recovers, he has in very many cases the great satisfaction of feeling that his patient has been restored to perfect health. Experience has proved that the remaining ovary generally carries on its functions, and that the woman may become the mother of healthy children of both sexes. The patient is not mutilated as by the amputation of a limb, nor does the general health suffer as it frequently does after the greater amputations. There certainly is nothing like the tendency to recurrence which there is after the removal of malignant tumours, probably by no means so frequent occurrence of disease elsewhere as after successful ligature of a diseased artery, or disease of the opposite lens after successful removal of one cataract, or formation of a second calculus after a removal of one by lithotomy or lithotrity; and certainly no such prolonged suffering as the chronic cystitis which not unfrequently follows these operations.

The rule is that by a successful ovariotomy the patient is restored to a state of health so perfect that she and her friends are as surprised as they are gratified. But there are exceptions to this rule. In some cases a disease believed to be innocent proves to be malignant, soon recurs, and proves fatal within a few months, or even within a few weeks after apparent recovery. In other cases the ovary which is left untouched because it is believed to be healthy, or so slightly diseased that its removal is uncalled for, becomes the seat of disease. In what proportion of cases this occurs we have at present only the information to be found in this volume. It is only within the last fifteen years that Ovariotomy has been performed sufficiently often to furnish data for reliable statistics, and it is difficult to ascertain, even in some of these later cases, what has been the state of the patient's health a few years after operation. But it would be unreasonable to expect that in all cases the ovary left in the body would remain healthy. It is for future observation to decide how often and in what class of cases a recurrence of disease may be feared. It is satisfactory, however, to learn that if the remaining ovary should become diseased, the first operation need not add much to the difficulty of a second, and that when a second ovariotomy has

been performed, it has proved successful in two out of the four cases in which I have operated, and in the case in which Dr. Atlee operated sixteen years after the first operation by Dr. Clay.

These rare exceptions to the general rule of complete restoration of perfect health cannot be considered as invalidating the claim of ovariotomy to be considered as one of the greatest of surgical triumphs—relieving suffering, saving life, restoring the dying woman to perfect health, and enabling her to fulfil all the duties of wife and mother.

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